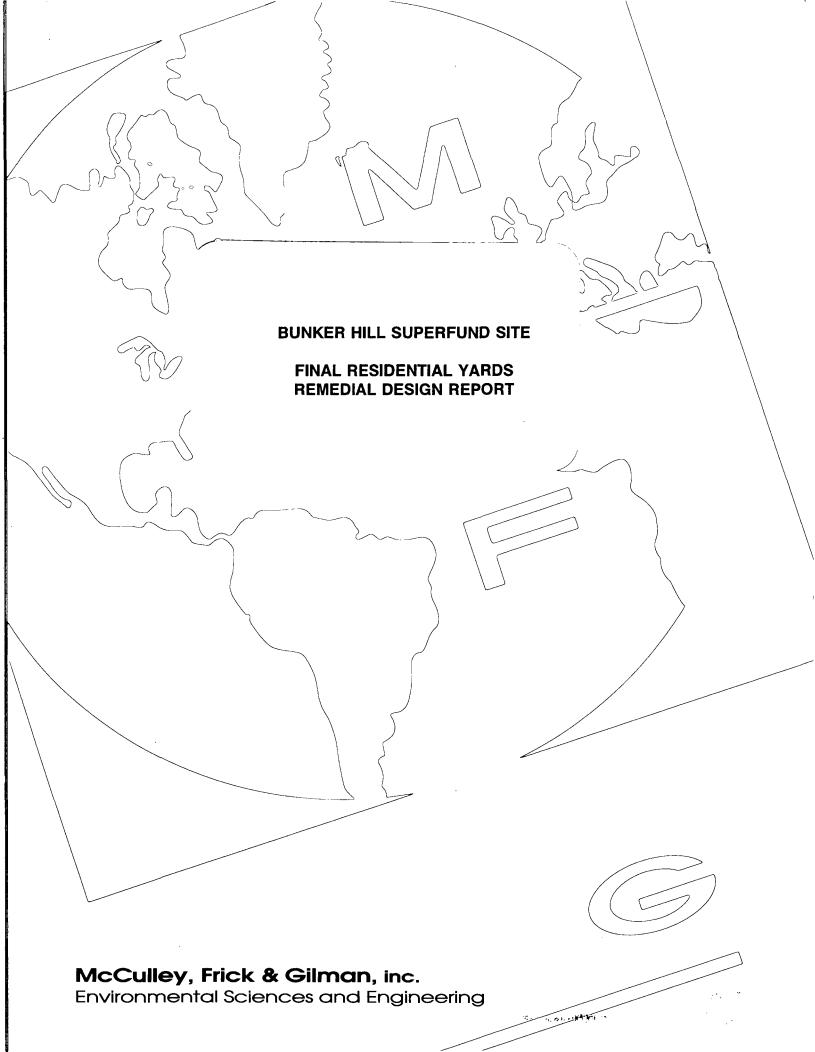
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BUNKER HILL SUPERFUND SITE

FINAL RESIDENTIAL YARDS REMEDIAL DESIGN REPORT

March 1994

Prepared For:

ASARCO INCORPORATED, HECLA MINING COMPANY, SUNSHINE MINING COMPANY

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BUNKER HILL SUPERFUND SITE FINAL RESIDENTIAL YARDS REMEDIAL DESIGN REPORT

1.0 INTRODUCTION

The purpose of this Remedial Design Report (RDR) is to provide a process through which residential yards are identified for remediation, the appropriate remedial action is selected, and the residential yard is remediated. Residential yard soil removal and replacement is included under the remedial alternative for the Bunker Hill Superfund Site Populated Areas described in the IDHW & EPA August 1991 Record of Decision (ROD). This RDR presents performance objectives and standards, technical analysis, and design and construction specifications. In addition, this RDR addresses operation and maintenance and lists all future deliverables required for Residential Yards remedial actions.

1.1 OVERVIEW

During the summer of 1986, an EPA Removal Program excavated lead-bearing soils from parks, playgrounds, and public rights-ofway. During the summer of 1989, the removal effort was extended to residences in Kellogg, Smelterville, Page, Wardner, and Ross Ranch. The residences were selected based on surface and subsurface lead levels at the residences of the portion of the population thought to be at greatest risk, households inhabited by children less than 6 years old or pregnant women. The 1990 residential removal continued where the 1989 removal ended and encompassed residences with children to 9 years old. The 1992 Bunker Hill Yard Remediation Program continued the 1991 remediation effort which addressed residences with children up to 12 years old and added the communities of Pinehurst and Elizabeth Park. Remediation efforts continued in 1993 and included residences with pregnant women and children up to and including 6 years old.

This RDR addresses residential soils within Area I of the 21 square mile Bunker Hill Superfund Site (Site) as defined by the Allocation Map in Attachment C of the Consent Decree. A copy of the Allocation Map is provided in Appendix A of this document. Specifically, this RDR provides:

- A sampling method for determining the need and/or level of remedial action required at any individual residential property within the Site.
- The criteria for selection of the specific remedial action.
- Procedures and specifications for soil replacement of residential yards selected for remediation.

The Area I boundaries between residential areas and the surrounding hillsides, as shown on the Allocation Map, are approximate. The boundary for Area I, where a residential yard abuts undeveloped hillsides, shall include only those contiguous hillside areas clearly used in conjunction with that residence. Residential yards and lots considered for remediation shall include those residential properties accessed by a maintained road on or before December 31, 1993. Platted but undeveloped residential lots that are not accessed by a maintained road on or before December 31, 1993 are excluded from Area I.

1.2 PERFORMANCE OBJECTIVES AND STANDARDS

IDHW and U.S. EPA have selected a remedy for residential soils at or above a threshold lead concentration of 1,000 ppm within the Site. This remedy addresses surficial soils only in currently established residential areas. This remedy does not focus on the complete removal of soil above the action level from residential yards, but focuses on creating a barrier between the soil above the action level and the residents. For the purposes of this RDR, soils above the action level are defined as soils with lead concentrations equal to or greater than 1,000 ppm.

1.2.1 Performance Objectives

The residential yard soil remediation objectives are to:

- 1) Reduce human contact with soil above the action level.
- 2) Reduce metals bearing fugitive dust.
- 3) Create average soil lead concentrations in the residential areas of the Site that are protective of human health.
- 4) Dispose of soils removed from residential yards in such a manner that human contact with such soils is prevented, and infiltration and airborne contaminant migration are controlled.

This remedial action is one of many actions designed to meet the overall Remedial Action Objective that 95 percent or more of the children tested in the blood lead survey have blood lead levels below 10 ug/dl and that less than 1 percent have blood leads greater than 15 ug/dl.

1.2.2 Performance Standards and Design Considerations

1.2.2.1 Residential Soil Sampling

All residential properties shall be sampled at the 0- to 1-, 1- to 6-, 6- to 12- and 12- to 18-inch intervals for determination of the 1,000 ppm lead threshold concentration. Sampling will also include discrete areas not previously sampled for yards previously dropped from a removal action list because yard soils were below the 1,000 ppm lead threshold level. Sampling and analysis shall be conducted according to Appendix B of this RDR. Residential soil sample results will be provided to the respective owners on the plot plan or in a letter to each owner.

Soil samples were collected from a geographic distribution of residential properties in the Bauman Subdivision (as delineated on the Allocation Map in Appendix A). Analysis results from the

properties sampled were below the 1,000 ppm action level. Therefore, yards in the Bauman Subdivision will not require further sampling or remediation.

1.2.2.2 Yard Soil Remediation

Based on the results of the yard soil sampling, for those residential yards that equal or exceed the 1,000 ppm lead action level, the extent of remediation will be determined as follows:

If Interval Equals or Exceeds Action Level		If Interval Less than Action Level		Remediation Depth		
0 - 1"		1 - 6", 6 - 12"]	6"		
1 - 6"		0 - 1", 6 - 12"		6"		
6 - 12"		0 - 1", 1 - 6"		12"		
12 - 18"		0 - 1", 1 - 6", 6 - 12"		NO REMEDIATION		
0 - 1", 1 - 6"	AND	6 - 12"	THEN	6"		
0 - 1", 6 - 12"		1 - 6"		12"		
1 - 6", 6 - 12"		0 - 1"		12"		
NONE		0 - 1", 1 - 6", 6 - 12"		NO REMEDIATION		

All produce garden areas in any yard being remediated will receive 24 inches of clean replacement soil. The size of replaced garden area will be the same as the existing garden area unless the property owner agrees to something less. At yards where no garden area currently exists a new garden area up to 150 square feet will be established if requested. New or existing garden locations will be identified on the site plans, which will become part of the ICP tracking system records. The need for a visual barrier below clean soil in garden areas will typically be based upon the lead concentration of the 12- to 18-inch depth sample. In instances where excavation to 24 inches does not occur and a garden soil barrier is constructed by placement of clean soil over existing

soils with concentrations greater than 1,000 ppm lead, the need for a barrier will be determined by the underlying soil concentrations as characterized by the 1- to 6-, 6- to 12-, and 12- to 18-inch yard samples.

A maximum of 11 cubic yards of clean soil for produce gardens will be delivered, upon request, to residents whose yards do not require remediation. The soil will be made available on a Reasonably Segregable Area basis during the period from initiation of construction activities within that Reasonably Segregable Area until work in that area has been certified as complete. Property owners will be notified by letter regarding the garden soil availability. A sign-off form for residents requesting clean soil is presented in Appendix C.

If existing grades permit and the landowner approves, clean replacement soil can be used as cover material for yards requiring remediation. The thickness of the fill will result in a minimum 12 inch barrier of clean soil overlying soils exceeding the action level. This scenario may not require excavation. A visual marker as defined in Section 4.1.6 will be placed on existing soil prior to placing fill.

For each residential yard requiring remediation, the exact nature of the remediation will be determined on a case-by-case basis. However, for consistency, the following areas will generally be remediated within each yard:

- Sod areas
- Roadway shoulders (if curb and gutter are not present) to asphalt or pavement and to the lateral extension of property lines
- Landscaped areas
- Play areas
- Garden areas
- Unpaved driveways

- Garages with dirt floors
- Storage areas
- Contiguous hillside areas clearly used in conjunction with a residence.

Areas immediately associated with the residential properties (i.e., road shoulders and alleys) will not require top soil, but will require replacement with clean material in kind or a permanent cover.

For residential yards or discrete areas that require excavation to 12 inches, and the results of sampling in the 12- to 18-inch interval for the yard area sample exceed the action level, a visual marker (such as erosion control fabric or other suitable material) will be placed prior to backfilling with clean fill.

During the excavation process, all existing sod and soil coverings will be removed and disposed of along with the soil. Larger trees and shrubs will be left in place. After spreading, compaction, and grading, clean fill will be revegetated if appropriate. The lawn areas of remediated yards will generally be revegetated with sod. Other remediated areas not currently planted with lawns, such as vacant lots or improved contiguous hillside areas not currently serving as lawns, will be stabilized and seeded with native grasses to achieve a ground-cover level of 85 percent within three years. If preferred by a property owner, seeding with native grasses could be substituted for the sod. To the extent practicable, all yard landscaping will be returned to its original condition. Removed Contaminated Soils shall be disposed of at the Page Pond Repository or other EPA-approved area.

Unpaved roadways within residential areas will be remediated concurrently with the residential area in accordance with the specifications presented in the Final Rights-of-Way (ROW) RDR. Requirements for removal and replacement of soils on vacant

residential lots within Residential Areas will be the same as for occupied properties.

1.2.2.3 <u>Clean Replacement Material</u>

Clean replacement material (including soil, gravel, etc.) is considered to contain less than 100 ppm lead, 100 ppm arsenic and 5 ppm cadmium based on the average of backfill sampling results. No replacement materials are to exceed 150 ppm lead. Sampling will be conducted in accordance with the Sampling and Analysis Plan (SAP) presented in Appendix B.

Replacement soil for yards, gardens, flower beds, and other landscaped yard areas will have properties that promote plant growth.

Remediated areas where EPA determines that revegetation is not necessary may receive clean gravel instead of soil.

1.2.2.4 Community Wide Average

Remediation of residential areas shall occur as scheduled on an annual basis. Upon completion of a Reasonably Segregable Area the average residential soil lead concentration shall be calculated following the procedure described in Section 8.0. If the average is 350 ppm lead, or greater, additional yards shall be remediated until the average for the Reasonably Segregable Area is calculated to be below the 350 ppm criterion.

2.0 TECHNICAL ANALYSIS

Based on past removal actions and the 1991 and 1992 RODs, the remedial designs outlined in this RDR for residential soils provide protection of human health through installation of a sod and soil barrier between residents and soil above the action level. In addition, the designs address the concerns of exposure through direct contact with soil above the action level or tracking of soil above the action level into homes as a source of house dust. Thus, the designs have a demonstrated ability to meet the performance objectives and therefore additional technical analysis is not required.

3.0 DESIGN

A detailed remediation plan for each residential yard and vacant residential lot will be prepared on a case-by-case basis. The procedure for plan preparation is outlined below.

3.1 SITE ASSESSMENT AND SELECTION

Residential properties selected for yard remediation will meet the following criteria:

- 1. Each property will be located within the Area I boundaries as shown on the Allocation Map (Appendix A). As previously stated, residential yards and lots considered for remediation shall include those residential properties accessed by a maintained road on or before December 31, 1993. Platted but undeveloped residential lots that are not accessed by a maintained road on or before December 31, 1993 are excluded from Area I.
- With the exception of the "High Risk Program" defined in Appendix D, remediation will be performed on an area-byarea basis. The property must be within the areas scheduled for remediation during that construction season. The construction season is considered to be from June 15 to mid October, barring unusual weather.
- 3. The property owner (and tenant, if applicable), shall have signed an access agreement that allows representatives of EPA, IDHW, Panhandle Health District (PHD), and the Settling Defendants access for entry, sampling, removal of lead-bearing materials from property, and remediation. The agreement will also provide for access for cap maintenance and inspection activities through the following construction season. Access for EPA and IDHW for future audits to evaluate cap integrity will also be addressed in the access agreement.
- 4. Properties will be selected for remediation on the basis of yard soils equal to or exceeding the 1,000 ppm lead remediation action level as discussed in Section 1.2.2.2. Sampling will be conducted on a block-by-block basis as outlined in the SAP in Appendix B. If yard soil lead levels in the 0- to 1-, 1- to 6-, or 6- to 12-inch interval are between 900 and 1,000 ppm lead and the property owner requests a resample, then the EPA/IDHW will resample the yard in accordance with the SAP in

Appendix B. Results of the resample will be used to determine the necessity of remediation.

3.2 COLLECTIVE AGREEMENT

The collective agreements among the property owners, the Settling Defendants, IDHW and/or the EPA, including access agreements, will be completed prior to starting remediation activities. These agreements will include a statement of work for each yard. Site-specific features for each yard will be identified and collectively agreed upon by the above-mentioned parties and will include the following:

- Access to the yards by contractor work crews;
- Requests that residents and visitors limit travel through work areas and that children and pets are also kept out of work areas during remediation;
- Excavation limits;
- Trees and/or shrubs to remain;
- Cultural features to be removed by the owner or tenant(s);
- Cultural features to be removed by the contractor;
- Produce garden areas requiring deeper excavation depths, garden soil up to 24 inches, and any special soil characteristic concerns;
- Limits of non-paved driveways to be remediated;
- On-site access to water;
- Removal or relocation of utilities and subsurface obstacles in the way of the remediation efforts;
- Prudent care of the new lawns by the owner;
- A list of site or asset damage that exists prior to remediation work being conducted;
- Special items of concern collectively agreed upon by the Settling Defendants, EPA, and/or IDHW and the homeowners;
- Warranty (see Appendix E);

- Maintenance obligations of the property owner required by the ICP; and
- Estimated schedule for remediation.

Residential yards that have been selected and for which access agreements have been completed will be scheduled for remediation. Once collective agreements are completed, the remediation contractor representatives will schedule a group of homes located within the same vicinity, street and community, to be prepared for remediation. Scheduling groups of homes together for remediation is necessary to limit disruption of a community and fugitive dust from trucks traveling through the streets, and because of safety concerns associated with transportation.

3.3 UTILITIES LOCATION

The remediation contractor will arrange with the local utility companies to visit each scheduled residence and locate electrical, water, sewer, gas, cable, and phone lines. The resident will be notified of this site visit and asked to participate, if needed, to provide information on subsurface obstacles such as septic systems and abandoned lines. The utility company will be requested to mark these utilities on the ground with colored spray paint. The remediation contractor will scan each yard for visible obstacles, and may utilize an electro-magnetic detector if there is reason to suspect buried obstructions have not been marked (i.e., sprinkler systems). Locations of subsurface obstacles will be confirmed, if necessary, by the remediation contractor hand digging to trace the orientation of the obstacle and to mark it adequately with spray paint. The type and location of the obstacle will be placed on a site plan, which will be issued to all work crews prior to remediation startup.

3.4 SITE PLAN & PHOTO DOCUMENTATION

The remediation contractor will develop a site plan for each site that will record all site-specific items identified in the access agreements. The site plan will map out areas for remediation, known caution zones with subsurface obstacles, and all utility locations that were marked during prior Site assessment tasks.

The site plan will provide a scale drawing that will record each residence's planned and actual remediation, including the following:

- Total depth of soils, gravel, and sod excavated on each site;
- Ingress and egress areas;
- Conditions of the existing yard including drainage characteristics and problems, its structures and placement of cultural items;
- Location of fences, approximate location of property boundaries, and demarcation stakes;
- Special instructions for field work crews, such as produce garden areas where more than 12 inches of soil are to be removed;
- Soil sampling data;
- Limits of excavation;
- Trees, shrubs, plants and landscaping to remain or be removed;
- Results of field verification program for barrier thickness (see Appendix F); and
- Need for and placement location of visual barrier.

The site plan will be used as a record for site-specific conditions that warranted such actions and all remediation activities that were completed at each residence. The site plan will be signed by the property owner, and representatives of the Settling Defendants

and the EPA and/or IDHW both before work is commenced and at its completion signifying acceptance by all parties. Prior to final sign off by the parties, the site plan will be revised to show actual work performed. The site plan will provide a detailed record of the remedial action planning efforts as well as the completed remedial action.

Photo documentation, by still photographs and/or videotapes, will be used to document pre-remediation and post-remediation conditions of yards, streets, alleys, and side walks. In the event a dispute arises between the remediation contractor or the Settling Defendants and homeowners or local governments, the photo documentation will be used to substantiate any claims. The photo documentation will become a portion of the permanent records for each property.

The site plans and photo documentation will be provided to the ICP for use in the tracking system. In addition, a copy of the completed and approved site plan will be provided to the property owner.

4.0 CONSTRUCTION

With the exception of the "High Risk Program" defined in Appendix D, yards will be remediated on a block-by-block or areaby-area basis. Prior to each construction season, a work plan will be prepared outlining those areas to be remediated that season. During the first and second construction seasons, a minimum of 130 (first season) and 200 yards (second season), will be remediated. Following the conclusion of the second construction season, representatives from EPA, the State, and the Settling Defendants will meet to reassess the minimum number of yards to be remediated during each remaining construction season. If no consensus is reached, the minimum will remain at 200. This reassessment will take into account the impact of the remediation on the communities.

4.1 YARD PREPARATION

4.1.1 Removal of Obstructions

The yard preparation will involve final notification to the homeowners of the intended action, date, and start time. notification will be made at least two weeks prior to the start of vard remediation. The homeowners will be asked to discuss any concerns or special requests they may have in removing surface obstacles or in preparing their yard for remediation. The Remediation Contractor will request that the homeowners remove and store personal possessions and keepsakes requiring special care inside of their homes. Woodpiles, walkway stepping stones, and other miscellaneous landscape articles will be relocated on-site, if possible. Large obstructions such as fences and gates will be removed if necessary to allow for ingress of equipment and access for the work crews. Garages with earthen floors will also require pre-remediation cleanup.

Permanent fixtures, other building structures connected to the houses or separate from the houses, and footings near buildings will be marked, photographed and identified as to their condition.

Large possessions, such as RVs, boats, or vehicles, shall be relocated by the homeowner. If necessary, a storage area will be provided by the contractors. In special cases, where the homeowner is physically unable, the contractor will assist the homeowner with the transport of possessions. Shields for subsurface pipelines left in place or support members to retaining walls and siding will be installed prior to the start of excavation activities.

4.1.2 Dust Control

Dust control will be achieved primarily through construction and engineering practices. In particular, visible emissions will be controlled to ensure that fugitive dust does not become a problem.

The remediation contractor will provide the equipment and labor to apply water to the yards during remediation activities. Water applications will be provided by the remediation contractor during the course of remediation and restoration operations on an as-needed basis as follows.

- Prior to excavation activities and the travel of equipment and work crew on-site on a daily basis;
- During soil removal operations by heavy equipment and with hand crews;
- At work intervals where wind and/or dry weather require such actions to prevent airborne emissions;
- Stockpiling and loading of soils into staging areas before off-site transportation;
- To wash down sidewalks, alleys, or streets impacted by soil handling and transportation activities (these areas may be swept if it can be accomplished without dust);
- To wash down as required paved areas at the entrance to back-fill and contaminated soil repositories;
- Before transportation off-site in dump trucks;
- Prior to backfilling and compacting soil covers during the restoration process; and

Prior to leaving the premises at the end of each workday.

Water applications will be limited to short-term applications. Saturated soil conditions will be avoided whenever possible to prevent ponding and mud conditions. Misting application with fogging type nozzles will be used whenever possible to use less water while providing adequate water coverage on the entire work area. After washing down sidewalks, streets, alleys and other paved areas, accumulated soil materials will be picked up and properly disposed of. In addition, storage piles of contaminated soils will be removed at the earliest opportunity to minimize the time these piles are left in residential areas. If stored accumulations of excavated, contaminated soils cannot be removed by the end of daily work they will be covered with tarpaulins. Under no circumstances will soils be washed down storm drains.

4.1.3 Excavation Activities

In preparation, excavation work crews will remove previously wetted soils by hand from lawns where heavy equipment has limited Soils will be raked from the fence areas left in place, underneath existing structures from around plants and trees being left, and in those confined areas where heavy excavation equipment will not be able to maneuver or reach adequately. Raking of soil in hand excavation areas will be limited to areas near buildings, sidewalks, impassable permanent obstacles such as shrubs and tree thickets, and in limited access areas. Tree roots will not be left exposed and when necessary soil around roots will be removed by hand after heavy equipment work is completed in adjoining areas, in order to protect existing landscaping. Care will also be taken to minimize the period of time excavated yards are left open; reasonable efforts will be made to backfill excavated yards within two days. Root structure for trees and shrubs will be protected during periods where yards are left open. After excavation, the field crew chief will inspect the excavated surface for obvious tailings deposits or visually identifiable hot spots. The tailings

will then be removed to a depth of 12 inches. Guidance for excavation activities will be presented in each Residential Areas Annual Remedial Action Work Plan. The work plans will provide specific procedures for excavation of soils in areas where trees and shrubs are present and will address interim care prior to soil replacement.

4.1.4 Heavy Equipment Operations

Ingress areas for heavy equipment travel will be secured, with adequate materials placed on sidewalks or other heavy traffic areas to protect them from damage during excavation work.

First-stage cuts will be taken near the edges of buildings and structures. This method will allow soil and sod to be removed easily from lawn edges by hand and will expedite the careful removal of lawns close to buildings and large structures.

Equipment will make the second-stage excavation cuts, which will include large open areas of the existing lawns. Hand crews will pile sod and soils removed from hand removal operations into central locations for loading into dump trucks. The pre-defined egress areas will be nearest the street for loading soils into dump trucks. Operation of heavy equipment will be conducted in a manner that avoids tracking contaminated soils through clean excavated areas.

Outlying areas will have soils and gravel removed after the central areas are completed. Work crews will not utilize procedures which will result in damage to buildings and structures. Spotters will communicate the zones of heavy equipment operations at all times to hand crews. Hand signals and communication plans for equipment operators and work crews will be developed and used. Bobcats may work in unison with backhoes to remove soils in tight areas.

4.1.5 Protection of Structures and Plants

Hand digging will be required for all areas susceptible to potential damage from heavy equipment operations. The remediation contractor will inspect large tree roots and structures during excavation operations and will take immediate appropriate steps if either are damaged.

Structures and buildings will be inspected for evidence of deformation or changes to existing conditions as documented in the site plan and in photographs from access agreements. The remediation contractor will contact the homeowners when conditions are discovered (through inspecting structures and plants) that warrant such notifications.

4.1.6 Visual Marker Application

If the results of sampling conducted by the Settling Defendants in the 12- to 18-inch interval equal or exceeding 1,000 ppm of lead, geofabric or other suitable material will be provided as a visual marker at the surface of the total depth of excavation. No visual marker will be placed by the remediation contractor if the total depth of remediation is less than 12 inches or if the soil sample results of the 12 - 18 inch depth are less than 1,000 ppm lead.

4.1.7 Temporary Work Stoppages

If conditions are encountered beyond the control of the remediation contractor that delay or prevent the performance of the yard remediation, the remediation contractor will stop work at the Site and immediately inform the Settling Defendants and the EPA and/or IDHW.

These conditions include but are not limited to the following:

- Uncovering of artesian wells or other subsurface flow phenomena;
- Building or structural impairments;
- Unknown utilities or subsurface features such as mine shafts or abandoned septic systems; and
- Other conditions unknown and beyond the control of the remediation contractor.

4.1.8 Clean Access for Property Owner

During remediation activities clean access will be provided to the resident at all times. Clean access means the resident will not have to walk through contaminated soil prior to entering their home. Sidewalks will be thoroughly brushed and washed off with water after each work day to provide as clean an entry as possible to the residence. If there is no sidewalk to the residence, a clean pathway will be provided to the resident by laying down plywood, pallets, plastic, or using some other means to prevent exposure and tracking of contaminated soils.

4.2 DECONTAMINATION PROCEDURES

After completion of excavation activities, heavy equipment and tools used in the remediation process will be decontaminated on Site. Decontamination will first involve a brush down of remediation equipment in the yard. Backhoe and bobcat tires, hoes, and buckets will be dry brushed. Use of water will be avoided whenever possible. The use of water will be required to adequately decontaminate equipment, if visible contamination is evident, prior to leaving the site for any reason. In these cases, the equipment will be washed while on the premises to minimize the migration of contaminated mud and water to the streets.

Workers will be required to decontaminate daily or whenever leaving a site where soil remediation is not completed and covered with a soil cap. A decontamination protocol will be included in the Health and Safety Plan and instituted by the remediation contractor's Site Manager. Streets, rights-of-way and access routes shall be cleaned of noticeable accumulations of soil, dust, or debris that are attributable to yard remediation activities.

4.3 SOIL DISPOSAL

Soil exceeding the action level and debris excavated from the residences selected to be remediated will be transported to the Page Pond Repository or other EPA/IDHW approved locations. The Page Pond Repository was used as the disposal site for the 1990, 1991, 1992, and 1993 Yard Remediations.

For soil volumes generated by the homeowner totaling less than 1 cubic yard, transportation and disposal will be provided to the community households within Area I. This is intended to support residential remodeling and gardening activities that generate small quantities of surficial soil and yard debris. The Page Pond Repository will be available for the disposal, in accordance with the ICP, of quantities of soils greater than 1 cubic yard which exceed the 1,000 ppm action level. Additional soils from Area I and outside Area I may also be accepted at Page Pond if capacity allows. Upon certification of completion of the residential soil removal and replacement activities, the ICP will manage soils transportation and disposal. These programs are defined in detail in the Institutional Controls Program Regulatory & Design Criteria Component Document and in the Institutional Controls Program Document, Attachment D to the Consent Decree.

4.3.1 Waste Transport

Soil exceeding the action level and debris excavated from the residences will be transported to the Page Pond Repository or other approved locations in street-legal trucks. Access to the

Repository will involve transport across public roads within the confines of the Superfund Site boundaries. This operation will be limited to daylight hours and will be done in a safe and controlled manner. Loads will be kept below the upper edges of the truck bed and will be covered prior to transport to minimize the dispersal of lead-bearing material through airborne emission or spillage. Truck liners will be used if free water is present in the excavated material or if soils are flowable. Spillage that occurs on city streets will be cleaned and removed as quickly as possible. Minor soil spillage outside of communities may be washed on to road shoulders with water if the road right-of-way has not been remediated.

4.3.1.1 Documentation

Documentation of the waste transport will include daily activity reports on a truck-load-basis per residence remediated. Records of these activities will be kept in the Site logbook for inclusion in the Construction Completion Report.

4.3.2 Repository Operation

The following subsections detail the operation of the Page Pond Repository. Additional information is provided in the Page Pond RDR.

4.3.2.1 <u>Dumping Procedures</u>

Dump trucks will be used to transport the excavated materials from each yard being remediated to the designated repository. Once at the repository and just prior to dumping, the cover will be removed from the truck and the load will be dumped in a drive-away manner. After dumping, decontamination procedures outlined in Section 4.2 will be followed.

4.3.2.2 Grading Procedures

Periodically, a bulldozer will be used at the repository to grade and compact the material in successive lifts to an even 4-foot maximum thickness. This dozer will be dedicated to the landfill or will be decontaminated before leaving the Site.

4.3.2.3 Dust Control

Dust will be minimized by using water trucks to spray the area of the deposited lead-bearing material to prevent airborne emissions from leaving the repository area. Spraying will be done on an as-needed basis.

4.3.2.4 <u>Decontamination</u>

All trucks and heavy equipment will be decontaminated before they leave the repository, as described in Section 4.2.

4.3.2.5 Access Control

The Page Pond Repository is secured within a locked chain link fence. Signs will be provided stating this is private property and to KEEP OUT. The gate to the repositories will be opened at the beginning of each day of activity and will remain open until close of repository operations for the day. The Settling Defendants will be responsible for ensuring that the repository is locked at the end of each day during the duration of the residential area remediation program. The operators of the PPWTP will be responsible for maintaining a separate gate accessing their plant. Weekend access, if necessary, will be provided through coordination with the ICP.

4.3.3 Seasonal Closure

Seasonal closure of the Page Pond Repository will occur at the completion of the annual construction activities. Once all of the

excavated material has been transported to the Page Pond Repository and no further excavation activities are to be conducted that construction season, a temporary grading of the material will be performed. Grading procedures will be followed to create a uniform stockpile of material. After the grading is completed, those portions of the Repository that have reached closure elevation will be revegetated. Other portions of the Repository will be seeded with an annual grass or other appropriate species to provide temporary vegetative cover for the expected duration prior to further placement of material. As required by the ICP and described in the Page Pond RDR, a designated area of the Page Pond Repository will be set aside to accept materials for disposal year round.

Seasonal closure methods for alternate disposal areas will be determined on a site-by-site basis as part of the approval process. Alternate repositories will not be available for disposal of soil above the action level generated by residential or commercial properties.

4.3.4 Documentation

The waste disposal activities of the repositories will be described in each Annual Construction Completion Report.

4.4 BACKFILL ACTIVITIES

Backfill activities at each site will involve the placement of clean topsoil and gravel in the area of the excavation. Each source of topsoil and gravel will be confirmed by laboratory analysis as described in the SAP (Appendix B). In the event that one (or more) of the samples fails the definition in Section 1.2.2.3, the source will be resampled and retested for confirmation. If any of the retest samples fail, the topsoil or gravel will be rejected as out of specification.

4.4.1 Rough Grade Procedures

Rough grading is the first phase of the restoration of each yard. Clean topsoil will be trucked to the site and will be placed in the area to be sodded or sealed.

Where access allows, the dump trucks will drive onto the yard and deposit their load while driving slowly to spread the material across the yard. Where possible, trucks will avoid driving on contaminated soils. Where access is limited, the dump trucks will dump their load at a staging area on the yard from which the backhoe or bobcat can transport the material to areas of the yard. Some handwork performed by laborers using wheelbarrows and shovels will be necessary to rough grade the yards. The rough grading of the areas requiring gravel will be done using the same methods. The objective of the rough grading is to provide sufficient backfill material to each yard for compaction prior to the sod application for the soils or for usage of the gravel areas.

4.4.2 Compaction

Compaction of the backfill material for the rough grading procedures will be accomplished using the buckets of either the backhoes or bobcats to back blade the material to the required thickness prior to the application of the sod. Gravel areas will be compacted, as appropriate, using suitable equipment to avoid future settlement and drainage problems in specific areas of a yard. Further compaction of backfill material may be required in areas where walkways and egress/ingress will occur.

4.4.3 Barrier Thickness Verification

Barrier thickness will be verified by the Project Coordinator or designee, after the above compaction procedures, utilizing the procedure presented in Appendix E.

4.5 SOD APPLICATION

The sod application includes the final grading of the topsoil and the necessary handwork using any one or more of the following items; small front end loaders, roller compactors, tamping compactors and hand tools prior to installation of the sod. The slope of the lawn will be considered in the final grading to ensure proper drainage away from the house or other structures on the property.

The sod will then be installed with tight seams and joints to meet with adjoining lawns, walks, fences, or borders. Exposed root areas will be covered with topsoil. Watering will be performed as required during this process.

4.6 FOLLOW-UP ACTIVITIES

Follow-up activities will be conducted to ensure that the work performed at each yard satisfies the scope of the yard remediation. The homeowners will be asked for their sign-off, attesting that the work performed meets their satisfaction. Lawn care, in terms of initial fertilization and watering required to establish the replaced lawns, will be provided. Each property remediated will be evaluated after 1 year, as described by the warranty to determine if the sod or the landscape plants, which were subject to excavation stress, survived a growing cycle. Sod or plants which do not survive as a result of the materials used or the installation is quaranteed and will be replaced. Any plants that need to be replaced will be replaced with similar plants. Thereafter it will be the responsibility of the owner to provide proper care of the vegetation and barriers. The warranty provides for replacement of plants, shrubs, and trees during the first year after remediation and addresses drainage issues for a period of 2 years.

4.6.1 Site Inspection

Once the remediation at each residence is completed, the Settling Defendants or their representative will inspect the site with the homeowners and EPA/IDHW representative. Photographs and/or videotapes will be taken within 30 days of completion and will be added to the project record. Should there be any dispute at any time between the homeowners and the remediation contractor or the Settling Defendants, every attempt will be made to resolve the dispute informally within the scope of work for that yard. If the homeowners and remediation contractor or Settling Defendants cannot reach an agreement, a final decision concerning the dispute will be made by a three-member Arbitration Panel consisting of one representative each from 1) EPA or the State of Idaho; 2) the Settling Defendants; and 3) a local government in the Silver Valley. An agreement to be used for this procedure is attached as Appendix F.

4.6.2 Repair Work

Repairs will be made for any damage that occurs as a result of the remediation. The photographic documentation of the preexisting and, where applicable, post-remediation condition of the residence will be used to determine if any damage has occurred as a result of the remediation. In the event there is a dispute regarding the cause of the damage, a final decision concerning the dispute will be made by the Arbitration Panel.

4.6.3 Lawn Maintenance

The remediation contractor will maintain the remediated yards through the summer until October 15 of the year the remediation took place. This lawn maintenance will include the necessary watering and fertilizing. Lawns will not be mowed as a part of this activity, and no further landscaping will be done except as required to complete the scope of the yard remediation.

4.6.4 Emergency Repairs

The Settling Defendants will provide the EPA, IDHW, or designated representative with a contact person who will be responsible for first response to emergencies on a 24-hour basis. Where an emergency exists that may create an immediate threat to public health or welfare or the environment, the Emergency Response section of the Consent Decree will apply. Where the EPA or IDHW Project Coordinator or designee makes a preliminary determination that substantial property damage is imminent or has occurred as a result of the remedial activities, the Settling Defendants will take action to stabilize or avert the damage within 24 hours of notification. The Settling Defendants will attempt to negotiate a permanent solution with the homeowner. If the homeowner and the Settling Defendants cannot agree on the permanent solution, the Arbitration Panel will make the final decision.

5.0 OPERATIONS AND MAINTENANCE

The ICP developed for the Bunker Hill Superfund Site is expected to accomplish the long-term operations and maintenance requirements for the remediation activities addressed by this RDR. The ICP will designate proper soil handling, pick-up, and disposal methods and will provide guidelines and requirements to ensure the long-term integrity of barriers installed as part of the residential areas remediation program.

6.0 SUMMARY OF PERTINENT REMEDIAL DESIGN INVESTIGATIONS

There are no additional remedial design investigations required for the residential yard remediation.

7.0 FUTURE DELIVERABLES (PLANS & REPORTS)

For the residential yard Component of Work at the Bunker Hill Superfund Site, the following described plans and reports will be submitted to the appropriate state and federal agencies as specified in the Consent Decree.

7.1 GENERAL PROJECT MANAGEMENT

7.1.1 Project Management Monthly Reports

The project management monthly reports submitted will include a section on the residential yard component of work when applicable. The residential yard section will include a minimum of the following basic information:

- General description of the work (currently being conducted);
- Activities/tasks undertaken during the reporting period, and expected to be undertaken during the next reporting period;
- Deliverables and milestones completed during the reporting period, and expected to be completed during the next reporting period;
- Identification of issues and actions that have been or are being taken to resolve the issues; and
- Status of the yard remediation schedule and any proposed schedule changes.

7.1.2 Technical Memoranda

The Technical Memoranda are the mechanism for requesting modification of plans, designs, and schedules. Technical Memoranda are not required for non-material field changes that have been approved by the agencies. In the event that the Settling Defendants determine that modification of an approved plan, design, or schedule is necessary, the Settling Defendants will submit a

written request for the modification to the Agency Project Coordinators which will include, but not be limited to, the following information:

- General description of and purpose for the modification;
- Justification, including any calculations, for the modification;
- Actions to be taken to implement the modification, including any actions related to subsidiary documents, milestone events, or activities affected by the modification; and
- Recommendations.

7.2 REMEDIAL DESIGN

No further submittals beyond this Final Residential Yards RDR will be required for the Residential Yard Element of Work.

7.3 REMEDIAL ACTION

A Residential Areas Annual Remedial Action Work Plan addressing all Residential Areas Elements of Work for a given geographic area shall be submitted by April 15 of each year, as described in Section V of the Statement of Work (SOW). Such work plans shall address the proposed remediation activities for Residential Yards, Water Well Closure, ROW, and Commercial Properties Elements of Work, to be completed within the boundaries of Area I during a construction season. An annual work plan may address all or a portion of one or more Reasonably Segregable Areas.

7.3.1 Residential Areas Annual Remedial Action Work Plans

Each year, the Settling Defendants will submit to the appropriate agencies a work plan outlining the proposed remediation activities to be completed during the construction season. The

work plan will include a section on residential yards. The work plan will be submitted each year by April 15. Barring unusual weather, the construction season will start on June 15 of each year. The Residential Areas Annual Remedial Action Work Plan will provide the following:

- An overall description of the work to be performed with cross-references to other documents, if any, containing more specific details.
- The technical approach for undertaking, monitoring, and completing the Element or Component of Work.
- A description of the deliverables and milestones.
- A construction schedule.
- Sampling and analysis requirements, including field verification programs.
- Construction O&M requirements.
- Plan for integrating, coordinating, and communicating with EPA, IDHW, and other government officials.
- Quality assurance measures.
- Additional health and safety measures.

At a minimum, the residential yard section of the work plan will include:

- The scope of proposed remediation; i.e., number of residential yards and vacant lots to be remediated;
- Yard sampling data;
- A map showing areas proposed for remediation during a construction season;
- A residential yard remediation schedule for the construction season;
- Any deviations or changes from work tasks or procedures outlined in the Residential Yard RDR;
- An initial list of high risk yards (See Appendix D).

The proposed contents for the Residential Area Annual Remedial Action Work Plans are described in greater detail in the SOW

7.3.1.1 Sampling Data

Yards will be sampled according to the work schedule developed by the Settling Defendants and presented in the Residential Areas Annual Remedial Action Work Plan. The yard sampling program will work in conjunction with the yard remedial action work plans. With the exception of the first remediation year, where timing will not allow, the sampling program will be conducted so that the communities designated for remediation will be sampled in the year just prior to the remediation year. For example, the area designated for remediation in the 1996 work plan will be sampled in 1995. Sampling and analysis will be conducted in accordance with the Sampling and Analysis Plan attached as Appendix B.

"High-Risk" remediation candidate yards, as defined in Appendix D, will be added to the sampling program as the list of these yards is received from the PHD. Prior to each upcoming construction season, EPA, in consultation with the State, may, until April 1 of each year, add the yards of homes meeting the "high risk" criteria (as outlined in Appendix D) to the list of yards to be remediated provided in the Residential Areas Annual Remedial Action Work Plan. EPA, in consultation with the State, may then add an additional 30 yards until September 15th. To help facilitate efficient scheduling of remediation activities, the Settling Defendants will be notified as soon as a high risk yard has been identified. EPA and the State will make best efforts to identify all high risk yards prior to September 1st. Yards added as part of the "high risk" program shall count toward the attainment of the annual minimum number criteria specified in Section 4.0.

The analytical results of the sampling program will be provided to the PHD, EPA, and IDHW as soon as is practicable after

the results are received and validated by the Settling Defendants. The data will be provided in a format acceptable to the agencies.

7.3.1.2 <u>Individual Yard Site Plans</u>

As outlined in Section 3.4 of this RDR, a scale site plan will be prepared for each residential yard and vacant lot where soil replacement is required. The scale site plan will be used as a permanent record to show site-specific conditions and remediation activities completed. The site plans will be incorporated into the Annual Construction Completion Reports and will be provided to PHD for use in the ICP tracking system. A copy of the final site plan, along with any other pertinent information, will also be provided to the property owner. The site plans will be signed by the Settling Defendants' Project Coordinator following the procedure outlined in Appendix E.

7.3.2 Health and Safety Plan

A Health and Safety Plan specific to the residential areas components of work will be prepared and submitted for agency review prior to the commencement of residential yard remediation activities. The Health and Safety Plan will include a description of monitoring activities to be undertaken during remediation of residential areas.

7.3.3 Annual Construction Completion Report

Construction activities completed during any construction season will be summarized in the Annual Construction Completion Reports. These reports will contain a complete listing and description of construction activities associated with the residential yard work that were completed during the previous construction season as well as other work prescribed in a Residential Areas Annual Remedial Action Work Plan. These reports will be submitted to EPA/IDHW within 60 days of completion of a construction season and will include the final site plans signed by

the Settling Defendants' Project Coordinator and initialed by the EPA/IDHW representative.

8.0 CERTIFICATION OF COMPLETION OF REMEDIAL ACTION

Certification of the completion of remedial action in a Reasonably Segregable Area is defined as the EPA and IDHW certifying that all yards and other Elements of Work (ROW, Commercial Properties, and Water Well Closure) within a Reasonably Segregable Area have been fully remediated in conformance with the Performance Standards set forth in the SOW and the applicable RDRs. Reasonably Segregable Areas within the Bunker Hill Site are identified in the SOW for the Consent Decree.

When Settling Defendants believe that the appropriate Performance Standards and conditions have been met for a Reasonably Segregable Area, they will submit a completion of Remedial Action Certification Report to EPA and IDHW for review. With respect to the Residential Yards Element of Work, the applicable Performance Standards and conditions are summarized as follows. The Performance Standards for the Element of Work are outlined in detail in Section 1.2.2 and the Statement of Work.

- 1. All yards have been sampled and analyzed for lead.
- 2. All yards equal to or greater than the 1,000 ppm lead concentration threshold have been remediated.
- 3. The post-remediation average yard lead concentration for the Reasonably Segregable Area is 350 ppm or less. The average will be calculated using the following data:
 - a) Average analytical results for lead concentrations from backfill utilized for all yards remediated during the appropriate construction season(s).
 - b) The analytical lead concentration from the 0 1 inch sampling interval from the non-remediated yards within a Reasonably Segregable Area; and
 - The average analytical lead concentrations from the 0 - 1 inch resampling of 10 percent the previously remediated yards (see #5 below). The average for the 10 percent resample will be used to represent all previously remediated yards within a Reasonably Segregable Area.

- 4. All yards in the Reasonably Segregable Area that were remediated under programs prior to those prescribed by this RDR will be visually inspected for potential damage to the previously installed barrier. Yards that have barriers compromised by property owner activity will be addressed on an individual basis. Specifically, the appropriate response by the Settling Defendants to mitigate the compromised barrier will be determined jointly by consultation of the Settling Defendants, PHD, and the EPA or IDHW Project Coordinator. The response chosen will be determined based on the actual activity causing the compromised barrier and the potential exposure risks posed by the compromised barrier.
- At least 10 percent of the yards described in Item 4 within the Reasonably Segregable Portion of Work will be sampled to verify barrier integrity. Samples will be collected to the depth of the barrier. The sampler will make a visual determination of the cap integrity from the removed core sample. Representative samples will be taken from the 0- to 1-inch interval and submitted to the lead analysis. analytical laboratory for collection for the remaining barrier thickness will be based on a visual determination of barrier thickness. Particular care must be exercised in this sampling effort so as to avoid contamination of the sample with nonremoved soils from below the barrier. Yards that demonstrate barrier lead concentrations above the 100 ppm level will be visually inspected jointly by the Settling Defendants and EPA or IDHW Project Coordinator to attempt to determine the cause and extent of the recontamination. Settling Defendants and EPA or IDHW Project Coordinator will determine any appropriate corrective action to be taken based on this inspection. The 0- to 1-inch analytical result from this sampling effort will be used to represent the 0- to 1-inch lead concentration for the previously remediated yards in the 350 ppm community-wide calculation as discussed in #3 above.

Reasonably Segregable Area certification will include all residential, commercial and rights-of-way properties and water well closures. All of the Elements of Work within a Reasonably Segregable Area will be subject to attainment of the pertinent Performance Standards identified in the SOW and the various RDRs, prior to certification. This combined certification of the Elements of Work within a Reasonably Segregable Area, will provide consistency in certification and assure that the intent prescribed in the ROD has been fulfilled. Furthermore, in most instances,

remediation of the three types of properties presented in the different RDRs will occur concurrently in a Reasonably Segregable Area.

The following statement regarding barrier thickness in a Reasonably Segregable Area will be provided by an Idaho-registered Professional Engineer in the Completion of Remedial Action Certification Report.

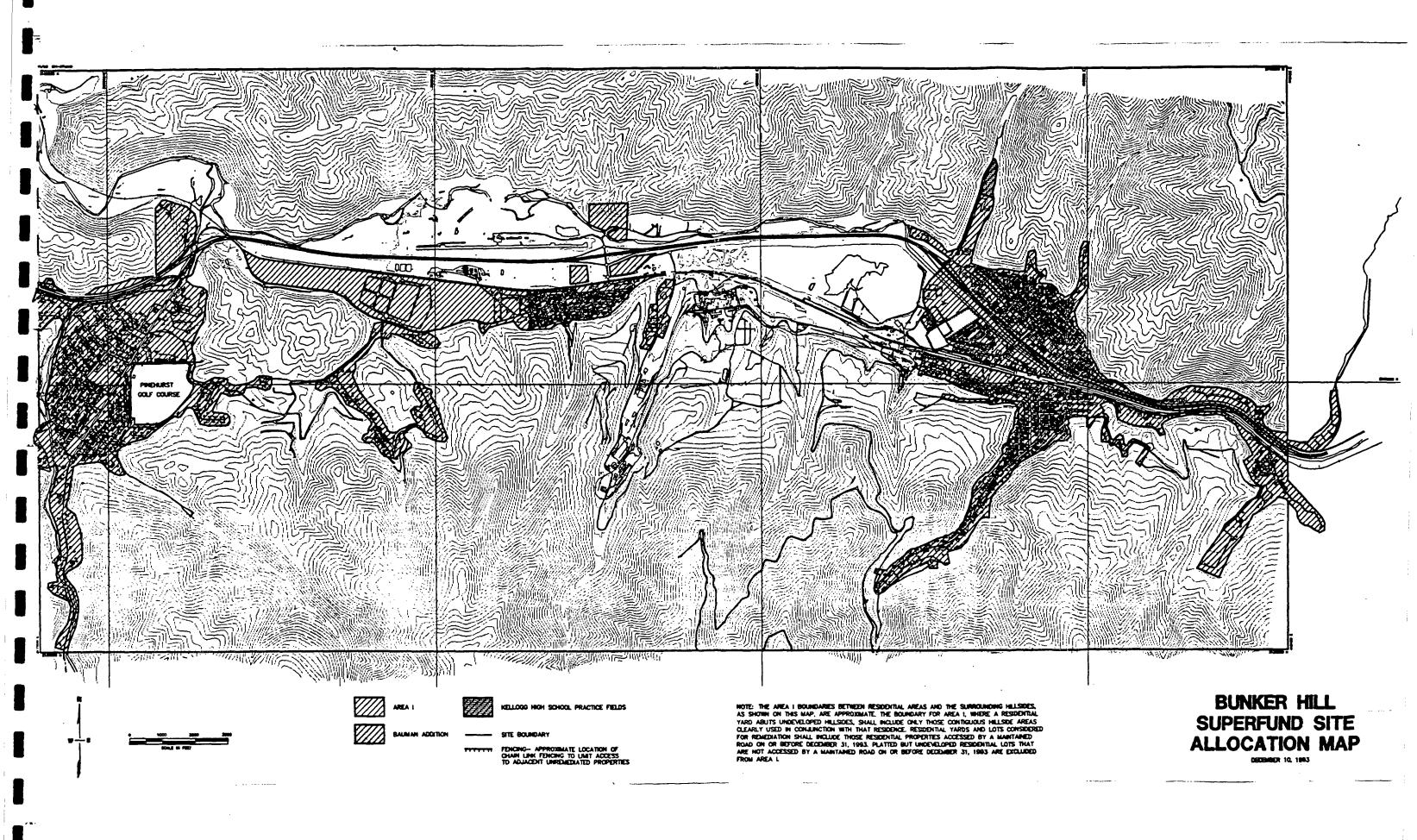
It is hereby certified that the thickness of the soil barrier layers constructed and the existence of a visual barrier in the designated residential yards, commercial properties, and rights-of-way within a Reasonably Segregable Area of the Site known as _____, represented by the inspection reports and sampling data included in the 'Residential Area Remediation Assessment and Certification' forms for the respective properties, is in full satisfaction of the Performance Standards for barrier thickness and placement of a visual barrier, as presented in the Bunker Hill Superfund Site Area I SOW and the Final Residential Yards, Commercial Properties and Rights-of-Way RDRs.

APPENDIX A

APPENDIX A
Allocation Map

APPENDIX A ALLOCATION MAP

Area I, which is being addressed by the Settling Defendants, is delineated on the attached Bunker Hill Superfund Site Allocation Map, as presented in the Consent Decree.



APPENDIX B Sampling and Analysis Plan (SAP)

APPENDIX B SAMPLING AND ANALYSIS PLAN (SAP)

1.0 YARD SOIL SAMPLING AND ANALYSIS

This section of the Sampling and Analysis Plan (SAP) describes the technical approach and quality control (QC) procedures necessary to perform yard soil sampling and analysis. The purpose of this section of the SAP is to provide the procedures that will assure the precision, accuracy, and documentation of data generated during yard soil sampling activities. The intent of the sampling effort is to identify residential yards which exceed the EPA's remedial action level of 1000 ppm total lead.

1.1 SOIL SAMPLING METHOD

Yard soil samples will be collected in order to identify those residential yards which are above the EPA remedial action level. Like intervals from each core will be composited to represent a specific depth interval for the sampled yard. The total depth to be sampled will be as specified in subsection 1.1.2, however, the total depth may vary depending on site conditions. If refusal of sampling equipment is experienced, an alternate location for collecting the sample should be chosen.

Prior to sampling, a lot and house plan will be developed and the location of all sampling points will be plotted on the plan. At the time of sampling, the sampling crew will designate discrete areas, such as driveways, play areas, parking areas, etc, on the plan, and indicate where any special discrete area samples are collected per the guidance submitted as part of the Annual Residential Areas Annual Remedial Action Work Plan. In the field, the plan will be used to locate the sample points based on paced distances from known objects such as roads, house and lot corners, telephone poles, etc.

Samples of the discrete areas may or may not be collected at the same time as the main yard samples. If collected at the same time as the main yard samples the discrete area samples will not be analyzed for lead until after the analytical results of the yard samples are received and evaluated. The decision of when to sample the discrete areas will be made by the Settling Defendants as needed.

1.1.1 Sampling Equipment and Information Collection

The sampling equipment will include the following items: soil sampling probe, shovel, pick, trowel, stainless steel bowls, knife, measuring tape, sample bags, 35mm camera, log book, pen, pencil, and marker.

Information that will be collected from each sampling point will include the location (i.e. house number) and depth.

All sampling equipment used for the extraction of soil will be decontaminated prior to removal off site. Decontamination equipment will include, pump sprayers, spray bottles, deionized water, phosphate free soap solution, scrub brushes, buckets, disposable gloves, etc.

1.1.2 Soil Sampling Locations and Depths

A minimum of two subsamples will be collected in all areas including yards, gravel driveways, play areas, and other discrete areas. These may be composited for a single sample if consistent with the area requirements set forth below.

1.1.2.1 <u>Yards</u>

Yard soil sample collection will consist of one core sample for every 500 square feet of yard area, excluding other discrete areas such as gravel driveways and distinct play areas, with a minimum of two core samples per yard. The house and lot plan will be gridded so that the sample crew can determine the square footage of yard excluding discrete areas. The sample crew will then divide the yard into 500 square foot sampling areas on the plan. The sample will be collected as close as possible from the center of each 500 square foot sampling area and fraction thereof. the sampling crew will avoid, if possible, the collection of samples under or immediately adjacent to trees, shrubs, structures, driveways, or sidewalks.

Cores will be collected to a total depth of 18 inches. Cores will be divided into 0-1", 1-6", 6-12", and 12-18" samples. Each depth interval sample will be placed into a separate sampling bag and marked with the appropriate identification. The four common depth interval samples from all cores collected from the yard will be composited into one sample and analyzed for lead.

1.1.2.2 Gravel Driveways

Gravel driveways are defined as beginning at the edge of the improved section of a residential lot and ending at the house or garage. Garage floors made of earthen materials will be considered part of the driveway. Distinctly separate driveways (i.e., non-contiguous) will be sampled and treated as separate driveways. Additional graveled road leading to a residence but not within the improved section of the lot is considered a right-of-way and will be remediated as such. Other discrete areas of the lot that are clearly identifiable as separate use areas, such as parking areas, will be considered separate areas and will be sampled as such.

A minimum of two samples will be taken from each gravel driveway. Two samples will be collected from driveways 50' in length or less. For driveways longer than 50', one additional sample will be collected for each additional 50' of driveway or fraction thereof. Sampling locations will be determined by dividing the total length of the driveway by the number of samples

to be collected plus 1. For example, for a driveway of 80 foot length, three samples are to be collected. Dividing 80 by 4 (i.e., 3 + 1), gives 20. Therefore, samples will be collected at 20 foot intervals or at 20', 40', and 60' along the length of the driveway. Samples will be collected with a soil probe, hand auger, or spade. The specific sampling tool utilized will be left to the discretion of the field sampling crew based on the composition of the driveway material to be sampled.

Samples will be collected to a total depth of 12 inches. Samples will be divided in 0-1", 1-6", and 6-12" samples. Each depth interval sample will be placed into a separate sampling bag and marked with the appropriate identification. The three common depth interval samples from all cores collected from the driveway will be composited into one sample. The samples will be analyzed for lead if laboratory analysis is conducted.

1.1.2.3 Play Areas

Play areas are defined as areas separate from and distinguishable from the rest of the yard and identified by visually different soil and/or physical separation from the yard along with evidence that the areas is used primarily for this purpose (such as an area bound by railroad ties, filled with sand or soil, and children's toys are evident). Note however, that a swing set located somewhere in the yard does not necessarily constitute a distinct play area.

Two samples will be collected and composited by interval from each identified play area. The samples will be collected randomly from the area. The play area samples may be collected with a soil probe, hand auger, or spade. The specific sampling tool utilized will be left to the discretion of the field sampling crew based on the composition of the area material to be sampled.

Samples will be collected to a total depth of 12 inches. Samples will be divided into 0-1", 1-6", and 6-12" samples. Each depth interval sample composite will be placed into a separate sampling bag marked with the appropriate identification. The sample will be analyzed for lead if laboratory analysis is conducted.

1.1.2.4 Other Discrete Areas

Other discrete areas are defined as areas separate from the rest of the yard and clearly identified as having a different functional use from the rest of the yard and are not driveways or play areas. An example is an area used solely as a parking area.

A minimum of two samples will be collected from each identified other discrete area. These samples may be composited to form a single sample. Samples may be collected with a soil probe, hand auger, or spade. The specific sampling tool utilized will be left to the discretion of the field sampling crew based on the composition of the area materials to be sampled. The sample will be collected in the approximate center of the area.

Samples will be collected to a total depth of 12 inches. Samples will be divided into 0-1", 1-6", and 6-12" samples. Each depth interval sample will be placed into a separate sampling bag marked with the appropriate identification. The sample(s) will be analyzed for lead if laboratory analysis is conducted.

1.1.3 Soil Collection and Handling Procedures

Soil extraction will typically be conducted using a sliding drop hammer with a 2" soil core diameter, capable of a vertical penetration into mineral soil of 18 inches. The drop hammer will be used to extract each of the three, 6 inch core intervals. The soil sample shall consist of mineral soil only. Samples may be collected with a soil probe, hand auger, or spade. The specific

sampling tool utilized will be left to the discretion of the field sampling crew based on the composition of the area materials to be sampled. Any surface vegetation, such as sod, will be removed prior to placing the sample in the sample bag.

Field personnel will wear disposable polyethylene gloves to avoid sample cross contamination during the collection of soil samples.

The following guidelines will be used for the extraction of yard soil samples:

- 1. If soil conditions prohibit sample collection for the 12" to 18" sub-sample (i.e. bedrock, river bottom gravel), this sample may be omitted.
- 2. Field sampling crews will avoid the collection of samples under or immediately adjacent to trees, shrubs and or structures. Samples will not be taken near the drip line of structures.
- 3. If impediments related to sample location occur in the field, a new sample point may be selected as close as possible to the original location.
- 4. Following the extraction of the 2" core sample, the sample hole will be back filled with clean fill material. The holes will be filled to a level which will match, as closely as possible, the existing yard level.

Following the collection of the first 6" interval of soil, the core will be extracted and the 0 to 1" of soil will be placed into a soil sampling bag and the remaining 1" to 6" of soil will be placed into its appropriate sampling bag. However the sod and underlying organic layer will be removed from the top of the 0 to 1" soil sample prior to placing it in the sample bag. The third interval (6" to 12") and the fourth (12" to 18") will be placed into their corresponding sample bags.

1.1.4 EQUIPMENT DECONTAMINATION

The following information describes the general decontamination procedures for field equipment that comes in contact with lead-bearing soil. Sampling equipment will be decontaminated between sample collection points, if the equipment is not disposable, in order to avoid cross contamination between samples.

Field personnel will wear disposable gloves while decontaminating equipment at the project site. Personnel will be required to take every precaution to prevent contaminating themselves with the wash water and rinse water used in the decontamination process.

The following procedures will be followed to ensure that sampling equipment is thoroughly decontaminated:

- 1. A decontamination zone will be set-up approximately 15 feet from the sampling area. The field crew leader will designate this area.
- Visually inspect sampling equipment for soil; a stiff brush will be used to remove any visible material.
- 3. Wash the field equipment with phosphate free soap and water, rinse with distilled water, and air dry or wipe with disposable paper towels.
- 4. Water used for decontamination will be disposed of on site. All disposable items such as, paper towels, disposable gloves and wash cloths, will be deposited into a garbage bag and disposed of in a solid waste landfill.

1.2 SOIL SAMPLE CUSTODY

The data collected during the sampling program requires that the possession of samples be traceable from the time they were collected, through the laboratory analytical process.

1.2.1 Sample Documentation

In order to provide adequate information of the residential yard sampling event, the field sampling crew will maintain a field logbook and field documents. The field documents will contain sufficient details. Entries will be made in indelible ink, with all corrections consisting of initialed line-out deletions.

The documents to be completed for each sample generated during the residential yard sampling program are:

- The field logbook
- Site Plan (Plot Plan)
- Chain-of-Custody Transmittal form (See Figure B-1)
- Sample tag and/or label
- Sample master log

The sampling identification system for all residential yard samples includes:

- The year
- The type of matrix
- The house or yard number
- The depth interval expressed as A, B, C, or D. E denotes a duplicate sample of one of the four depth intervals.

Denotation of A, B, C, and D represent the 0 to 1", 1" to 6", 6" to 12", and 12" to 18" depth intervals.

Upon completion, a Chain-of-Custody transmittal form (Figure B-1) will be filled out and samples will be delivered to the laboratory.

1.2.2 Field Log Book

All pertinent field survey and sampling information will be recorded in a bound field logbook, during each day of the field sampling and at each sample site. All entries into the field logbook will be made in indelible ink. Each day's entries will be initialed and dated at the end of each day by the field sampling crew. All corrections shall consist of line-out deletions, which are initialed.

At minimum, entries in the field logbook shall include:

- Date and time at the start of work and description of weather conditions.
- Names of field sampling crew.
- Project name or number.
- Description of site conditions and any unusual circumstances.
- Location of sample site, including map reference.
- Equipment identification.
- Details of actual work effort, particularly any deviations from the aforementioned methods.
- Field observations.
- Time that field work was terminated for the day.
- Specific details for each sampling location will be recorded.
- Details of photo documentation, if any.
- Site description (i.e., physical address and assessor parcel number).

Strict chain-of custody procedures will be maintained with the field logbook. While being used in the field, field logbooks will remain with the field team at all times. Upon completion of the

field effort, field logbooks will be filed in an appropriately secure manner.

1.2.3 Sample Packaging and Shipping

Each sample container will be properly labeled in the field. Each sample will be hand delivered to the contract laboratory for analysis.

Coolers may be used only as a convenient shipping/storage container; the samples will not be cooled until they are received by the laboratory. An alternative sample storage container may also be used, as long as it allows adequate protection against breakage and loss of chain of custody.

1.3 QUALITY CONTROL (QC) SAMPLES

Quality Control (QC) samples will be used to check the precision and accuracy of analyses completed by the analytical laboratory. QC samples will not have any unique identifying codes that will enable the laboratory to bias them. The sampling team will strive to obtain uniformity in the sampling technique and preparation of QC samples to limit potential sampling errors. The QC sampling will be identified only in the field logbook and the in-house Sample Master Log form. Samples identified in the field logbook will include:

- Soil
- Duplicate
- Rinsate (Equipment) Blank

One of the following QC samples will be implemented into the sample train at a minimum of one for every 10 soil samples. The QC samples will be defined as follows:

1. The duplicate sample will be of the same media, of the same location and collected at the same time.

- 2. An rinsate (equipment) blank will be a distilled water rinse of decontaminated sampling equipment, placed into a sample bottle.
- 3. A blind field standard.
- 4. A laboratory split will be provided to the EPA/IDHW representative for possible external analysis at a CLP lab.

1.4 ANALYTICAL PROTOCOLS

Soil samples and associated rinsate blanks will be received by the analytical laboratory in accordance with chain-of-custody procedures. These samples will be analyzed for lead using methods detailed in Test Methods for Evaluating Solid Waste. Revised Methods. SW-846. Third Ed. U.S. Environmental Protection Agency, Washington, D.C. Soil samples will be digested in accordance with SW-846 method 3050 after sample preparation as specified in Table B-1. Rinsate blanks will be digested in accordance with SW-846 method 3010. After digestion, all samples will be analyzed for lead by flame atomic absorption spectrophotometry in accordance with SW-846 method 7420.

The report of analytical results will include a cover letter from the laboratory identifying the sample group and any non-complaint quality control results together with the affected samples. Attached to the cover letter will be a summary of sample results and a summary of quality control results. The summary of quality control results will include instrument performance results such as standard recoveries and blanks results; matrix QC results such as spikes, duplicates and procedural blanks; and laboratory control standard recoveries.

Chain-of-custody records and internal laboratory operational and quality control documents will be kept in a site file at the laboratory for audit if desired.

1.5 DATA COLLECTION AND MANAGEMENT

All residential yard soils sampling data and analytical results will be stored on a Lotus[™] 123 computer data base. The data will be available as either a Lotus file or in another format. This Lotus[™] 123 spread sheet format will facilitate retrieval and analysis of soil yard data. The data will be provided to the agencies upon request, when available. Data validation procedures will correspond to Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (USEPA, July 1, 1988) provided after Page B-19, at the end of this appendix.

2.0 BACKFILL SAMPLING AND ANALYSIS

This section of the Sampling and Analysis Plan (SAP) describes the details of the technical approach and quality control (QC) procedures necessary to perform backfill sampling and analysis activities associated with residential yard remediation. The purpose of this SAP is to ensure that clean fill material is used to replace the removed, lead-bearing soil.

2.1 BACKFILL SAMPLING METHOD AND FREQUENCY

Prior to fill replacement, samples of the clean fill material will be collected at a frequency of once for every two residential yards of material provided by a source of supply. This equates to roughly one sample per 200 cubic yards of material. A sample will also be collected at the beginning of use of clean fill from a new source or when materials from the existing source are visually different in appearance. One QA sample (duplicate) will be collected for each 10 backfill samples. Samples will be sent to a commercial laboratory and analyzed for lead, arsenic, and cadmium. This procedure will ensure that the fill material (which includes gravel, rock, sand, and soil) being used does not exceed maximum concentrations of 150 ppm for lead, 100 ppm for arsenic, and 5 ppm for cadmium. In addition, the arithmetic mean of all like samples

(soil, gravel, etc.), calculated by construction season, must not exceed 100 ppm for lead.

2.1.1 Sampling Equipment and Information Collection

The sampling equipment will include the following items: stainless steel bowls, stainless steel spoons, shovels, clean sampling containers, log book, pen, pencil, and marker.

Information that will be collected from each sampling point will include the location of the sample. A suitable hand drawn map will be developed showing the approximate location of sample points.

All sampling equipment used for sampling will be decontaminated prior to reuse.

2.1.2 Backfill Sampling Locations

Samples of the clean fill material will be collected from each source of fill material. As new stockpiles are prepared from different sources, additional samples will be collected.

2.1.3 Sample Collection Procedure

A composite sample will be collected from each clean soil or gravel stockpile of clean fill and analyzed for lead, arsenic and cadmium prior to the material used as backfill. Five to eight discrete samples to be composited will be collected by the following procedure: A shallow hole approximately 4" - 12" deep will be dug using a decontaminated sample spade to expose fresh fill material. The material will then be removed using a stainless steel spoon and placed in a sample bag. Sample splits for QC purposes will be done at this time. Each sample will be given a sample designation to indicate the sample location and sample number.

The sample locations and designations as well as a location sketch map will be recorded in a field logbook.

2.1.4 Decontamination Procedures

All sampling equipment used will be decontaminated after each sample batch has been collected. This will include stainless steel bowls, stainless steel spoons, shovels, and any other equipment that has come in contact with the samples. The following decontamination procedure will be used:

- 1. Remove gross contamination by brushing.
- 2. Wash and scrub with phosphate-free detergent.
- 3. Rinse with deionized water.
- Air dry or wipe with clean paper towels.

2.2 FILL SAMPLE CUSTODY

The data collected during the sampling program requires that the possession of samples be traceable from the time they were collected, through the laboratory analytical process.

2.2.1 Sample Documentation

In order to provide adequate information of the fill sampling event, the field sampling crew will maintain a field logbook and field documents. The field documents will contain sufficient details. Entries will be made in indelible ink, with all corrections consisting of initialed line-out deletions.

The documents to be completed for each sample generated during the fill sampling program are:

- The field logbook
- Site description
- Chain-of-Custody Transmittal form (See Figure B-1)
- Sample tag and/or label
- Sample master log

Upon completion, a Chain-of-Custody transmittal form (Figure B-1) will be filled out and samples will be delivered to the laboratory.

2.2.2 Field Log Book

All pertinent field survey and sampling information will be recorded in a bound field logbook, during each day of the field sampling and at each sample site. All entries into the field logbook will be made in indelible ink. Each day's entries will be initialed and dated at the end of each day by the field sampling crew. All corrections shall consist of line-out deletions, which are initialed.

At minimum, entries in the field logbook shall include:

- Date and time at the start of work and description of weather conditions.
- Names of field sampling crew.
- Project name or number.
- Description of site conditions and any unusual circumstances.
- Location of sample site, including map reference.
- Equipment identification.
- Details of actual work effort, particularly any deviations from the aforementioned methods.
- Field observations.
- Time that field work was terminated for the day.
- Specific details for each sampling location will be recorded.
- Details of photo documentation if any.

Strict chain-of custody procedures will be maintained with the field logbook. While being used in the field, field logbooks will

remain with the field team at all times. Upon completion of the field effort, field logbooks will be filed in an appropriately secure manner.

2.2.3 Sample Packaging and Shipping

Each sample container will be properly labeled in the field. Each sample will be hand delivered to the contract laboratory for analysis.

Coolers may be used only as a convenient shipping/storage container; the samples will not be cooled until they are received by the laboratory. An alternative sample storage container may also be used, as long as it allows adequate protection against breakage and loss of chain of custody.

2.3 QUALITY CONTROL (QC) SAMPLES

Quality Control (QC) samples will be used to check the precision and accuracy of analyses completed by the analytical laboratory. QC samples will not have any unique identifying codes that will enable the laboratory to bias them. The sampling team will strive to obtain uniformity in the sampling technique and preparation of QC samples to limit potential sampling errors. The QC sampling will be identified only in the field logbook and the in-house Sample Master Log form. Samples identified in the field logbook will include:

- Soil
- Duplicate
- Rinsate (Equipment) Blank

In addition to the composite sample collected for each soil source, a duplicate sample will be analyzed for QA/QC data. This sample will be a split sample prepared by taking one composite sample from each source and dividing it to obtain two samples. The duplicate

will be taken once per each ten backfill samples. Rinsate blanks will be collected and analyzed for QA/QC data. This sample is obtained by using a distilled water rinse of decontaminated sampling equipment placed into a sample bottle. The QC samples will be defined as follows:

- 1. The duplicate sample will be of the same media, of the same location and collected at the same time.
- An rinsate (equipment) blank will be a distilled water rinse of decontaminated sampling equipment, placed into a sample bottle.

2.4 ANALYTICAL PROTOCOLS

Soil samples and associated rinsate blanks will be received by the analytical laboratory in accordance with chain-of-custody procedures. These samples will be analyzed for arsenic, cadmium, and lead using methods detailing in Test Methods for Evaluating Solid Waste. Revised Methods. SW-846. Third Ed. U.S. Environmental Protection Agency, Washington, D.C. Soil samples will be digested in accordance with SW-846 method 3050 after sample preparation as specified in Table B-1. Rinsate blanks will be digested in accordance with SW-846 method 3010. After digestion, all samples will be analyzed for arsenic, cadmium, and lead by atomic absorption spectrophotometry in accordance with SW-846 method 7000 or by inductively coupled plasma atomic emission spectroscopy in accordance with SW-846 method 6010.

The report of analytical results will include a cover letter from the laboratory identifying the sample group and any non-complaint quality control results together with the affected samples. Attached to the cover letter will be a summary of sample results and a summary of quality control results. The summary of quality control results will include instrument performance results such as standard recoveries and blanks results; matrix Q.C. results

such as spikes, duplicates and procedural blanks; and laboratory control standard recoveries.

Chain-of-custody records and internal laboratory operational and quality control documents will be kept in a site file at the laboratory for audit if desired.

2.5 DATA COLLECTION AND MANAGEMENT

All clean fill sampling data and analytical results will be stored on a LotusTM 123 computer data base. The data will be available as either a Lotus file or in another format. This LotusTM 123 spread sheet format will facilitate retrieval and analysis of the data. The data will be provided to the agencies , when available.

3.0 HEALTH AND SAFETY

All field personnel will have, at a minimum, completed the OSHA approved 40-hour Health and Safety training course. Field personnel will be monitored by the assigned site health and safety officer. All personnel will be attired in appropriate modified level D work clothing. Based on air monitoring results and on visible airborne dust, the site health and safety officer may require workers to suspend sampling activities, until conditions are suitable for working. Field personnel will have read the site-specific Health and Safety Plan prior to conducting sampling.

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Table B-1 Sample Preparation

Sample Preparation

Soil and fill material are heterogeneous bodies of matter. The composite are also too large to be handled in the analytical laboratory. Preparation procedures must therefore homogenize the sample and extract a representative, repeatable sample prior to chemical analysis.

The following procedure will be followed for all soil and fill samples:

- 1. The as-received bulk sample will be placed into a dry and clean stainless steel pan and dried at 60°C. Water content will not be determined.
- 2. The dried material will be disaggregated by screening through a U.S. Standard No. 10 sieve. Large clods will be broken by hand. The technician will wear a clean set of polyethylene disposable gloves during this process. Material that will not pass through the No. 10 sieve will be discarded.
- 3. The material will be split with a riffler splitter to form two sub samples weighing approximately one kilogram each, if possible. The excess material, if any, will be discarded.
- 4. One of the samples obtained during this step will be labeled and archived.
- 5. The other sample will be screened through a U.S. Standard No. 80 sieve. The material passing through the sieve will form the analytical sub sample. The material retained by the sieve will be discarded.

The analytical sub samples will then be sent to the analytical chemist for digestion and analysis.

LABORATORY DATA VALIDATION

FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES

Prepared for the

HAZARDOUS SITE EVALUATION DIVISION U.S. ENVIRONMENTAL PROTECTION AGENCY

SUPERFUND REMEDIAL BRANCH

Compiled by

Ruth Bleyler Sample Management Office Viar & Company Prepared by.

The USEPA Data Review Work Group
Jeanne Hankins - EPA Region III - Chairperson
Frank Messina, Laura Scalise - EPA Region II
Gary Bennett - EPA Region IV
Ida Levin - EPA Region V
Mahmoud El-Feky - EPA Region VI
Larry Marchin - EPA Region VII

July 1, 1988

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INTRODUCTION

This document is designed to offer guidance in laboratory data evaluation and validation. In some aspects, it is equivalent to a Standard Operating Procedure (SOP). In other, more subjective areas, only general guidance is offered due to the complexities and uniqueness of data relative to specific samples. These Guidelines have been updated to include all requirements in the 7/87 Statement of Work (SOW) for Inorganics, Amendment 1 and December 1987 Revisions.

Those areas where specific SOPs are possible are primarily areas in which definitive performance requirements are established. These requirements are concerned with specifications that are not sample dependent; they specify performance requirements on matters that should be fully under a laboratory's control. These specific areas include blanks, calibration standards, calibration verification standards, laboratory control standards, and interference check standards. In particular, mistakes such as calculation and transcription errors must be rectified by resubmission of corrected data sheets.

This document is intended for technical review. Some areas of overlap between technical review and Contract Compliance Screening (CCS) exist, however, determining contract compliance is not intended to be a goal of these guidelines. It is assumed that the CCS is available and can be utilized to assist in the data review procedure.

At times, there may be an urgent need to use data which do not meet all contract requirements and technical criteria. Use of these data does not constitute either a new requirement standard or full acceptance of the data. Any decision to utilize data for which performance criteria have not been met is strictly to facilitate the progress of projects requiring the availability of the data. A contract laboratory submitting data which are out of specification may be required to rerun or resubmit data even if the previously submitted data have been utilized due to urgent program needs; data which do not meet specified requirements are never fully acceptable. The only exception to this requirement is in the area of requirements for individual sample analysis; if the nature of the sample itself limits the attainment of specifications, appropriate allowances must be made. The overriding concern of the Agency is to obtain data which are technically valid and legally defensible.

All data reviews must have, as a cover sheet, the Inorganic Regional Data Assessment (IRDA) form. (A copy is attached at the end of this document.) If mandatory actions are required, they should be specifically noted on this form. In addition, this form is to be used to summarize overall deficiencies requiring attention, as well as general laboratory performance and any discernible trends in the quality of the data. (This form is not a replacement for the data review.) Sufficient supplementary documentation must accompany the form to clearly identify the problems associated with a Case. The form and any attachments must be submitted to the Contract Laboratory Program Quality Assurance Coordinator (CLP QAC), the Regional Deputy Project Officer (DPO), and the Environmental in Monitoring Systems Laboratory in Las Vegas (EMSL/LV).

It is the responsibility of the data reviewer to notify the Regional DPO concerning problems and shortcomings with regard to laboratory data. If there is an urgent requirement, the DPO may be contacted by telephone to expedite corrective action. It is recommended that all items for DPO action be presented at one time. In any case, the Inorganic Regional Data Assessment form must be completed and submitted.

PRELIMINARY REVIEW

In order to use this document effectively, the reviewer should have a general overview of the Case at hand. The exact number of samples, their assigned numbers, their matrix, and the number of laboratories involved in their analysis are essential information. Background information on the site is helpful but often this information is very difficult to locate. The site project officer is the best source for answers or further direction.

CCS is a source of a large quantity of summarized information. It can be used to alert the reviewer of problems in the Case or what may be sample-specific problems. This information may be utilized in data validation. If CCS is unavailable, those criteria affecting data validity must be addressed by the data reviewer.

Cases routinely have unique samples which require special attention by the reviewer. Field blanks, field duplicates, and performance audit samples need to be identified. The sampling records should provide:

- 1. Project Officer for site
- 2. Complete list of samples with notations on
 - a) sample matrix
 - : b) blanks*
 - c) field duplicates*
 - d) field spikes*
 - e) QC audit sample*
 - f) shipping dates
 - g) labs involved
 - * If applicable

The chain-of-custody record includes sample descriptions and date of sampling. Although sampling date is not addressed by contract requirements, the reviewer must take into account lag time between sampling and shipping while assessing sample holding times.

INORGANICS PROCEDURE

The requirements to be checked in validation are listed below. ("CCS" indicates that the contractual requirements for these items will also be checked by CCS; CCS requirements are not always the same as the data review criteria.)

I. Holding Times (CCS - Lab holding times only)

II. Calibration

- o Initial (CCS)
- o Initial and Continuing Calibration Verification (CCS)
- III. Blanks (CCS)
- IV. ICP Interference Check Sample (CCS)
- V. Laboratory Control Sample (CCS)
- VI. Duplicate Sample (CCS)
- VII. Matrix Spike Sample (CCS)
- VIII. Furnace Atomic Absorption QC (CCS)
- IX. ICP Serial Dilution (CCS)
- X. Sample Result Verification (CCS 10%)
- XI. Field Duplicates
- XII. Overall Assessment of Data for a Case

I. HOLDING TIMES

A. Objective

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis.

Note: The holding time is based on the date of collection, rather than verified time of sample receipt, and date of digestion/distillation. It is a technical evaluation rather than a contractual requirement.

B. Criteria

Technical requirements for sample holding times have only been established for water matrices. The following holding time and preservation requirements were established under 40 CFR 136 (Clean Water Act) and are found in Volume 49, Number 209 of the Federal Register, page 43260, issued on October 26, 1984.

METALS: 6 i

6 months; preserved to pH < 2

MERCURY:

28 days; preserved to pH < 2

CYANIDE:

14 days; preserved to pH > 12

C. Evaluation Procedure

Actual holding times are established by comparing the sampling date on the EPA Sample Traffic Report with the dates of analysis found in the laboratory raw data (digestion logs and instrument run logs). Examine the digestion and/or distillation logs to determine if samples were preserved at the proper pH.

Analyte Holding Time (Days) = Analysis Date - Sampling Date

D. Action

- 1. If 40 CFR 136 criteria for holding times and preservation are not met, qualify all results > Instrument Detection Limit (IDL) as estimated (J) and results < IDL as estimated (UJ).
- 2. If holding times are exceeded, the reviewer must use professional judgment to determine the reliability of the data and the effects of additional storage on the sample results. The expected bias would be low and the reviewer may determine that results < IDL are unusable (R).
- 3. Due to limited information concerning holding times for soil samples, it is left to the discretion of the data reviewer whether to apply water holding time criteria to soil samples. If the data are qualified when water holding time criteria are applied to soil samples, it must be clearly documented in the review.

II. CALIBRATION

A. Objective

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

B. Criteria

1. Initial Calibration

Instruments must be calibrated daily and each time the instrument is set up.

a. ICP Analysis

A blank and at least one standard must be used in establishing the analytical curve.

- b. Atomic Absorption Analysis (AA)
 - 1) A blank and at least three standards, one of which must be at the Contract Required Detection Limit (CRDL), must be used in establishing the analytical curve.

3

- The correlation coefficient must be ≥0.995.
 Note: The correlation coefficient of 0.995 is a technical criterion and not contractual.
- c. Mercury Analysis
 - 1) A blank and at least four standards must be used in establishing the analytical curve.
 - 2) The correlation coefficient must be ≥0.995.
- d. Cyanide Analysis
 - 1) A blank and at least three standards must be used in establishing the analytical curve.
 - 2) A midrange standard must be distilled.
 - 3) A correlation coefficient ≥0.995 is required for photometric determination.
- 2. Initial and Continuing Calibration Verification (ICV and CCV)
 - a. Analysis results must fall within the control limits of 90 -110 percent Recovery (%R) of the true value for all analytes except mercury and cyanide.
 - b. Analysis results for mercury must fall within the control limits of 80-120%R.
 - c. Analysis results for cyanide must fall within the control limits of 85-

C. Evaluation Procedure

- 1. Verify that the instrument was calibrated daily and each time the instrument was set up using the correct number of standards and blank.
- 2. Verify that the correlation coefficient is ≥ 0.995
- 3. Check the distillation log and verify that the midrange CN standard was distilled.
- 4. Recalculate one or more of the ICV and CCV %R per type of analysis (ICP, GFAA, etc.) using the following equation and verify that the recalculated value agrees with the laboratory reported values on Form IIA. Due to possible rounding discrepancies, allow results to fall within 1% of the contract windows (e.g., 89-111%).

$$%R = \frac{Found}{True} \times 100$$

Where,

Found = concentration (in ug/L) of each analyte <u>measured</u> in the analysis of the ICV or CCV solution

D. Action

- 1. If the minimum number of standards as defined in section B were not used for initial calibration, or if the instrument was not calibrated daily and each time the instrument was set up, qualify the data as unusable (R).
- 2. If the correlation coefficient is <0.995, qualify results > IDL as estimated (J), and results < IDL as estimated (UJ).

Note: For critical samples, further evaluation of the calibration curve may be warranted to determine if qualification is necessary.

- 3. If the midrange CN standard was not distilled, qualify all associated results as estimated (J).
- 4. If the ICV or CCV %R falls outside the acceptance windows, use professional judgment to qualify all associated data. If possible, indicate the bias in the review. The following guidelines are recommended:
 - a. If the ICV or CCV %R falls outside the acceptance windows but within the ranges of 75-89% or 111-125% (CN, 70-84% or 116-130%; Hg, 65-79% or 121-135%), qualify results > IDL as estimated (J).
 - b. If the ICV or CCV %R is within the range of 111-125% (CN, 116-130%; Hg, 121-135%), results < IDL are acceptable.
 - c. If the ICV or CCV %R is 75-89% (CN, 70-84%; Hg, 65-79%), qualify results < IDL as estimated (UJ).
 - d. If the ICV or CCV %R is <75%, (CN, <70%; -Hg, <65%), qualify all positive results as unusable (R).
 - e. If the ICV or CCV %R is >125%, (CN >130%; Hg >135%), qualify results > IDL as unusable (R); results < IDL are acceptable.

III. BLANKS

A. Objective

The assessment of blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks applies to any blank associated with the samples. If problems with <u>any</u> blank exist, all data associated with the Case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the Case, or if the problem is an isolated occurrence not affecting other data.

B. Criteria

No contaminants should be in the blank(s).

C. Evaluation Procedures

Review the results reported on the Blank Summary (Form III) as well as the raw data (ICP printouts, strip charts, printer tapes, bench sheets, etc.) for all blanks and verify that the results were accurately reported.

D. Action

Action in the case of unsuitable blank results depends on the circumstances and origin of the blank. Sample results > IDL but <5 times the amount in any blank should be qualified as (U).

Any blank with a negative result whose absolute value is > IDL must be carefully evaluated to determine its effect on the sample data.

Note: The blank analyses may not involve the same weights, volumes, or dilution factors as the associated samples. In particular, soil sample results reported on Form I will not be on the same basis (units, dilution) as the <u>calibration</u> blank data reported on Form III. The reviewer may find it easier to work from the raw data when applying 5X criteria to soil sample data/calibration blank data.

In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. The results must not be corrected by subtracting any blank value.

IV. ICP INTERFERENCE CHECK SAMPLE (ICS)

A. Objective

The ICP Interference Check Sample verifies the contract laboratory's interelement and background correction factors.

B. Criteria

- 1. An ICS must be run at the beginning and end of each sample analysis run (or a minimum of twice per 8 hour working shift, whichever is more frequent).
- 2. Results for the ICS solution AB analysis must fall within the control limits of ± 20% of the true value.

C. Evaluation Procedure

1. Recilculate from the raw data (ICP printout) one or more of the recoveries using the following equation (%R) and verify that the recalculated value agrees with the laboratory reported values on Form IV.

ICS %R = Found Solution AB x 100
True Solution AB

Where,

Found Solution AB = concentration (in ug/L) of each analyte measured in the analysis of solution AB

True Solution AB = concentration (in ug/L) of each analyte in solution AB

2. Check ICS raw data for results with an absolute value > IDL for those analytes which are not present in the ICS solution.

D. Action

- 1. For samples with concentrations of Al, Ca, Fe, and Mg which are comparable to or greater than their respective levels in the Interference Check Sample:
 - a. If the ICS recovery for an element is >120% and the sample results are < IDL, this data is acceptable for use.
 - b. If the ICS recovery for an element is >120% and the sample results are > IDL, qualify the affected data as estimated (J).
 - c. If the ICS recovery for an element falls between 50 and 79% and the sample results are > IDL, qualify the affected data as estimated (J).
 - d. If sample results are < IDL, and the ICS recovery for that analyte falls within the range of 50-79%, the possibility of false negatives may exist. Qualify the data for these samples as estimated (UJ).
 - e. If ICS recovery results for an element fall <50%, qualify the affected data as unusable (R).

Note: If possible, indicate the bias for the estimated results in the review.

- 2. If results > IDL are observed for elements which are not present in the EPA provided ICS solution, the possibility of false positives exists. An evaluation of the associated sample data for the affected elements should be made. For samples with comparable or higher levels of interferents and with analyte concentrations that approximate those levels found in the ICS (false positives), qualify sample results > IDL as estimated (J).
- If negative results are observed for elements that are not present in the EPA ICS solutions, and their absolute value is > IDL, the possibility of false negatives in the samples may exist. If the absolute value of the negative results is > IDL, an evaluation of the associated sample data should be made. For samples with comparable or higher levels of interferents, qualify results for the affected analytes < IDL as estimated (UJ).
- 4. In general, the sample data can be accepted if the concentrations of A1, Ca, Fe and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. If these elements are present at concentrations greater than the level in the ICS, or other elements are present in the sample at >10 mg/L, the reviewer should investigate the possibility of other interference effects by using Table 2 given on page D-22 of the 7/87 SOW. These analyte concentration equivalents presented in the Table should be

considered only as estimated values, since the exact value of any analytical system is instrument specific. Therefore, estimate the concentration produced by an interfering element. If the estimate is >2X CRDL and also greater than 10% of the reported concentration of the affected element, qualify the affected results as estimated (J).

V. LABORATORY CONTROL SAMPLE (LCS)

A. Objective

The laboratory control sample serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation.

B. Criteria

- 1. All aqueous LCS results must fall within the control limits of 80-120%R, except So and Ag which have no control limits.
- 2. All solic LCS results must fall within the control limits established by the EPA. This information is available from EMSL/LV.

C. Evaluation Procedure

- 1. Review Form VII and verify that results fall within the control limits.
- 2. Check the raw data (ICP printout, strip charts, bench sheets) to verify the reported recoveries on Form VII. Recalculate one or more of the recoveries (GR) using the following equation:

$$LCS \%R = \frac{LCS Found}{LCS True} \times 100$$

Where,

LCS Found = concentration (in ug/L for aqueous; mg/kg for solid) of each analyte measured in the analysis of LCS solution

LCS True = concentration (in ug/L for aqueous; mg/kg for solid) of each analyte in the LCS source

D. Action .

Aqueous LCS

- a. If the LCS recovery for any analyte falls within the range of 50 79% or >120%, qualify results > IDL as estimated (J).
- b. If results are < IDL and the LCS recovery is greater than 120%, the data are acceptable.
- c. If results are < IDL and the LCS recovery falls within the range of 50-79%, qualify the data for the affected analytes as estimated (UJ).

d. If LCS recovery results are <50%, qualify the data for these samples as unusable (R).

Solid LCS

- a. If the solid LCS recovery for any analyte falls outside the EPA control limits, qualify all sample results > IDL as estimated (J).
- b. If the LCS results are higher than the control limits and the sample results are < IDL, the data are acceptable.
- c. If the LCS results are lower than the control limits, qualify all sample results < IDL as estimated (UJ).

VI. DUPLICATE SAMPLE ANALYSIS

A. Objective

Duplicate analyses are indicators of laboratory precision based on each sample matrix.

B. Criteria

- 1. Samples identified as field blanks cannot be used for duplicate sample analysis.
- 2. A control limit of \pm 20% (35% for soil) for the Relative Percent Difference (RPD) shall be used for sample values >5X CRDL.
- 3. A control limit of ±CRDL (±2X CRDL for soil) shall be used for sample values <5X CRDL, including the case when only one of the duplicate sample values is <5X CRDL.

C. Evaluation Procedure

- 1. Review Form VI and verify that results fall within the control limits.
- 2. Check the raw data and recalculate one or more RPD using the following equation to verify that results have been correctly reported on Form VI.

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where,

S = First Sample Value (original)

D = Second Sample Value (duplicate)

Verify that the field blank was not used for duplicate analysis.

D. Action

1. If duplicate analysis results for a particular analyte fall outside the appropriate control windows, qualify the results for that analyte in all associated samples of the same matrix as estimated (J).

2. If the field blank was used for duplicate analysis, all other QC data must be carefully checked and professional judgment exercised when evaluating the

Note: This information must be included on the IRDA form.

VII. MATRIX SPIKE SAMPLE ANALYSIS

A. Objective

The matrix spike sample analysis provides information about the effect of each sample matrix on the digestion and measurement methodology.

B. Criteria

- 1. Samples identified as field blanks cannot be used for spiked sample analysis.
- 2. Spike recovery (%R) must be within the limits of 75-125%. However, spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of 4 or more.

C. Evaluation Procedure

- Review Form V and verify that results fall within the specified limits.
- 2. Check raw data and recalculate one or more %R using the following equation to verify that results were correctly reported on Form V.

$$%R = \frac{(SSR - SR)}{SA} \times 100$$

Where.

SSR = Spiked Sample Result

SR = Sample Result
SA = Spike Added

3. Verify that the field blank was not used for spike analysis.

D. Action

- 1. If the spike recovery is >125% and the reported sample results are < IDL, the data is acceptable for use.
- 2. If the spike recovery is >125% or <75% and the sample results are > IDL, qualify the data for these samples as estimated (J).
- If the spike recovery falls within the range of 30-74% and the sample results are < IDL, qualify the data for these samples as estimated (UI).
- 4. If spike recovery results fall <30% and the sample results are < IDL, qualify the data for these samples as unusable (R).

5. If the field blank was used for matrix spike analysis, all other QC cata must be carefully checked and professional judgment exercised when evaluating the data

Note: This information must be included on the IRDA form.

Note: If the matrix spike recovery does not meet criteria (except in Ag), a post digestion spike is required for all methods except furnace, but this data is not used to qualify sample results. However, this information must be included in the IRDA report.

VIII. FURNACE ATOMIC ABSORPTION OC

A. Objective

Duplicate injections and furnace post digestion spikes establish the precision and accuracy of the individual analytical determinations.

B. Criteria

- 1. For sample concentrations > CRDL, duplicate injections must agree within ±20% Relative Standard Deviation (RSD), (or Coefficient of Variation (CV)), otherwise the sample must be rerun once (at least two additional injections).
- 2. Spike recovery must be ≥85% and ≤115%.
- 3. The Furnace Atomic Absorption Scheme must be followed as rescribed in the 7/87 SOW, p. E-15.

C. Evaluation Procedure

- 1. Check raw data to verify that duplicate injections agree within ±20% RSD (or CV) for sample concentrations > CRDL.
- 2. Review Furnace AA raw data to verify that the Furnace Atomic Absorption Scheme has been followed.

D. Action

- If duplicate injections are outside the $\pm 20\%$ RSD (or CV) limits and the sample has not been rerun once as required, qualify the data as estimated (J).
- 2. If the rerun sample results do not agree within $\pm 20\%$ RSD (or CV), qualify the data as estimated (J).
- 3. If the post digestion spike recovery is <40%, qualify results > DL as estimated (J).
- 4. If the post digestion spike recovery is ≥10%, but <40%, quality results < IDL as estimated (UJ).
- 5. If the post digestion spike recovery is <10%, qualify results < IDL as unusable (R).

- 6. If sample absorbance is <50% of the post digestion spike absorbance then:
 - a. If the furnace post digestion spike recovery is not within 85-115%, qualify the sample results > IDL as estimated (J).
 - b. If the furnace post digestion spike recovery is not within 85-115%, qualify the sample results < IDL as estimated (UJ).
- 7. If Method of Standard Additions (MSA) is required but has not been done, qualify the data as estimated (J).
- 8. If any of the samples run by MSA have not been spiked at the appropriate levels, qualify the data as estimated (J).
- 9. If the MSA correlation coefficient is <0.995, qualify the data as estimated (J).

IX. ICP SERIAL DILUTION

A. Objective

The serial dilution determines whether significant physical or chemical interferences exist due to sample matrix.

B. Criteria

If the analyte concentration is sufficiently high (concentration in the original sample is minimally a factor of 50 above the IDL), an analysis of a 5-fold dilution must agree within 10% Difference (%D) of the original results.

C. Evaluation Procedures

1. Check the raw data and recalculate the %D using the following equation to verify that the dilution analysis results agree with results reported on Form IX.

$$%D = \frac{[I-S]}{I} \times 100$$

Where,

- I = Initial Sample Result
- S = Serial Dilution Result (Instrument Reading x 5)
- 2. Check the raw data for evidence of negative interference, i.e., results of the diluted sample are significantly higher than the original sample.

D. Action

- 1. When criteria are not met, qualify the associated data as estimated (J).
- 2. If evidence of negative interference is found, use professional judgment to qualify the data.

X. SAMPLE RESULT VERIFICATION

A. Objective

The objective is to ensure that the reported quantitation results are accurate.

B. Criteria

Analyte quantitation must be calculated according to the appropriate SOW.

C. Evaluation Procedures

The raw data should be examined to verify the correct calculation of sample results reported by the laboratory. Digestion and distillation logs, instrument printouts, strip charts, etc. should be compared to the reported sample results.

- 1. Examine the raw data for any anomalies (i.e., baseline shifts, negative absorbances, omissions, legibility, etc.).
- 2. Verify that there are no transcription or reduction errors (e.g., dilutions, percent solids, sample weights) on one or more samples.
- 3. Verify that results fall within the linear range of the ICP (Form XIII) and within the calibrated range for the non-ICP parameters.
- 4. Verify that sample results are >5X ICP IDL, if ICP analysis results are used for As, Tl, Se, or Pb.

Note: When the laboratory provides both ICP and furnace results for an analyte in a sample and the concentration is > ICP IDL, the results can assist in identifying quantitation problems.

D. Action

If there are any discrepancies found, the laboratory may be contacted by the designated representative to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, the reviewer may determine qualification of the data is warranted.

XI. FIELD DUPLICATES

A. Objective

Field duplicate samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than lab duplicates which measure only lab performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field samples.

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B. Criteria

There are no review criteria for field duplicate analyses comparability.

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C. Evaluation Procedures

Samples which are field duplicates should be identified using EPA Sample Traffic Reports or sample field sheets. The reviewer should compare the results reported for each sample and calculate the Relative Percent Difference (RPD), if appropriate.

D. Action

Any evaluation of the field duplicates should be provided with the reviewer's comments.

XII. OVERALL ASSESSMENT OF DATA FOR A CASE

It is appropriate for the data reviewer to make professional judgments and express concerns and comments on the validity of the overall data for a Case. This is particularly appropriate when there are several QC criteria out of specification. The additive nature of QC factors out of specification is difficult to assess in an objective manner, but the reviewer has a responsibility to inform the user concerning data quality and data limitations in order to assist that user in avoiding inappropriate use of the data, while not precluding any consideration of the data at all. If qualifiers other than those used in this document are necessary to describe or qualify the data, it is necessary to thoroughly document/explain the additional qualifiers used. The data reviewer would be greatly assisted in this endeavor if the data quality objectives were provided. The cover form and supplementary documentation must be included with the review.

GLOSSARY A

Data Qualifier Definitions

For the purposes of this document the following code letters and associated definitions are provided.

- The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J The associated value is an estimated quantity.
- R The data are unusable. (Note: Analyte may or may not be present.)
- UJ The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

GLOSSARY B

Additional Terms

Associated Samples	Any sample related to a particular QC analysis. For example: For ICV, all samples run under the same calibration curve.
	- For duplicate RPD, all SDG samples digested/distilled of the same matrix.
AA	Atomic Absorption
Calibration Curve	A plot of absorbance versus concentration of standards
Case	A finite, usually predetermined number of samples collected in a given time period for a particular site. A Case consists of one or more Sample Delivery Groups.
ССВ	Continuing Calibration Blank - a deionized water sample run every ten samples designed to detect any carryover contamination.
ccs	Contract Compliance Screening - process in which SMO inspects analytical data for contractual compliance and provides EMSL/LV, laboratories, and the Regions with their findings.
CCV	Continuing Calibration Verification - a standard run every ten samples designed to test instrument performance.
CLP	Contract Laboratory Program
CRDL	Contract Required Detection Limit
CV	Coefficient of Variation
DPO	Deputy Project Officer
EMSL/LV	Environmental Monitoring System Laboratory/ Las Vegas (P.O. Box 15027, Las Vegas, Nevada 89114)
Field Blank	Field blanks are intended to identify contaminants that may have been introduced in the field.

Examples are trip blanks, travel blanks,

rinsate blanks, and decontamination blanks.

Field Duplicate

A duplicate sample generated in the field, not in the

laboratory.

Holding Time

The time from sample collection to laboratory

analysis.

ICB

Initial Calibration Blank - first blank standard run to

confirm the calibration curve.

ICP

Inductively Coupled Plasma

ICS

Interference Check Sample

ICV

Initial Calibration Verification - first standard run to

confirm the calibration curve.

Initial Calibration

The establishment of a calibration curve with the appropriate number of standards and concentration range. The calibration curve plots absorbance or emission versus concentration of

standards.

IRDA

Inorganic Regional Data Assessment

LCS

Laboratory Control Sample - supplied by EPA

MS

Matrix Spike - introduction of a known concentration of analyte into a sample to provide information about the effect of the sample matrix on the digestion and

measurement methodology.

MSA

Method of Standard Addition

Post digestion Spike

The addition of a known amount of standard after digestion. (Also identified as analytical spike,

or spike, for furnace analyses.)

QAC

Quality Assurance Coordinator

RPD

Relative Percent Difference

RSCC

Regional Sample Control Center

RSD

Relative Standard Deviation

Serial Dilution

A sample run at a specific dilution to determine whether any significant chemical or physical interferences exist due to sample matrix effects.

(ICP only)

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SDG

Sample Delivery Group - defined by one of the following, whichever occurs first:

- case of field samples
- each twenty field samples in a Case
- each 14-day calendar period during which field samples in a Case are received, beginning with receipt of the first sample in the SDG.

SMO

Sample Management Office

SOP

Standard Operating Procedure

SOW

Statement of Work

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Reg	ion	
0		

INORGANIC REGIONAL DATA ASSESSMENT

CASE NO		SITE							
LABORATORY		NO. OF SAMPLES/ MATRIX							
SDG#									
SOW#			•	• —					
DPO: ACTION FYI _									
,									
	DATA ASSES	SMENT SU	MMARY						
		ICP	AA	. Hg	CYANIDE				
I. HOLDING TIMES					<u> </u>				
2. CALIBRATIONS		٠.			·				
3. BLANKS	•	<u> </u>							
4. ICS	•								
5. LCS		· 							
6. DUPLICATE ANALYSI	S								
7. MATRIX SPIKE									
8. MSA									
9. SERIAL DILUTION	••		•		•				
10. SAMPLE VERIFICATIO	N								
II. OTHER QC									
12. OVERALL ASSESSMEN	ıT	·							
O = Data had no problems/ M = Data qualified due to a Z = Data unacceptable. X = Problems, but do not a	major problems.	to minor pr	oblems.						
ACTION ITEMS:				······································					
									
		·			·				
AREAS OF CONCERN:		····							
				· · · · · · · · · · · · · · · · · · ·	<u> </u>				
OTABLE PERFORMANCE:_			· · - · · · · · · · · · · · · · · · · ·						
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APPENDIX C

APPENDIX C

Receipt for Delivery of Garden Soil

RECEIPT FOR DELIVERY OF GARDEN SOIL

have soil the addr gard I ha	del tha comp ess, en. ve lo	ated, ivered t I wind anies and I wil	the Hecla to me ill use will it is l use t the ga	Mining a maximum to mak not de my res he space	Idaho Compa: mum of e a pr eliver sponsib e belo and wil	. ny, and the control of the control	At nd Su n (11 garde more to p lraw a	my nshine cubi n. I garde out tl rough	requese Minite of Minite o	st ASA ng Comp ls of clusted stand to l to to l into th of what Panhar	ARCO pany lear that this my here
				Owner						Date	
			ı	Tenant	(if appl	icable.)		Date		
							 .	·			
				HOUS	E						
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				•	STRE	ET.		•			- 1

APPENDIX D

APPENDIX D

"High Risk" Yard Remediation

APPENDIX D

1.0 DEFINITION OF "HIGH-RISK" YARD REMEDIATION CANDIDATE

High-risk yard remediation candidates are defined as:

- 1. Homes where children six years of age and under are in residence.
- 2. Homes with pregnant women in residence.
- 3. Licensed Day Care Centers.
- 4. Homes where the most recent blood lead survey indicates that children in residence have a blood lead level equal to or greater than 10 $\mu g/dl$ and the PHD has determined that the yard soil exposure is a significant exposure pathway.

2.0 ADDING "HIGH-RISK" YARDS TO THE SETTLING DEFENDANT WORKPLAN

EPA, in consultation with the State and PHD, will provide a "high-risk" yard remediation candidate list to the Settling Defendants by April 1 of each year. Candidates will be selected from information obtained by the PHD by community survey and the most recent blood lead survey.

EPA, in consultation with the State and PHD, may add up to an additional 30 "high-risk" yard remediation candidates to the remediation program for that construction season by September 15 of the year. To facilitate efficient scheduling of remediation activities, the Settling Defendants will immediately be notified as soon as high-risk yard has been identified. EPA and the State will make best efforts to identify all high-risk yards prior to September 1 of the year. Yards added as part of the "high-risk" program shall count toward the attainment of the annual minimum. Any yard remediation candidates identified after the September 15 deadline will be included in the candidate list for the next year's yard remediation project.

APPENDIX E

APPENDIX E

Bunker Hill Superfund Site Warranty Residential Areas Remediation Assessment and Certification

WARRANTY

ASARCO, Incorporated, Hecla Mining Company and Sunshine Mining Company
("the Companies") agree to replace any sod, lawn, trees, shrubs or other
landscaping removed or damaged during the remediation of your yard, which is
located at,, Idaho. The
Companies will water and fertilize your new lawn as necessary from the time it
is replanted until October 15 of the same year. The Companies will not mow the
lawn, weed any part of your yard, or provide any other gardening or landscaping
services. The Companies also agree to correct any drainage problems and
associated property damage that result from the remediation and occur within two
years of the completion of the remediation of your yard.

The Companies guarantee that any sod, lawn, trees and shrubs will survive for one calendar year after the remediation of your yard is completed. Sod, grass, trees and shrubs that die within one calendar year, as a result of the excavation and remediation activities, will be replaced by the Companies. If the sod, lawn, trees, or shrubs die because you or your tenant do not water or otherwise take care of them, or because of damage caused by any other person, the Companies will not repair the damage or be held responsible.

The Companies will return to your yard approximately one year after the remediation to see if any lawn or landscaping needs replacing under the terms of this Warranty. After this follow-up inspection and any replacement of landscaping, if needed, the Companies will have no further responsibility for your lawn, sod, trees, shrubs or other landscaping.

At the time of the landscaping follow-up inspection, the Companies will also look for any signs of poor drainage. At any time during the two year period after your yard is remediated, you may notify the Companies, Panhandle Health District, or EPA/IDHW representative of any drainage problems that you believe were caused by the remediation, and the Companies will respond.

If there is a dispute about whether any damage to landscaping or drainage problems are the responsibility of the Companies to replace, the Companies will work with you to see if satisfactory arrangements can be made. If we cannot come to an agreement, we agree to follow the arbitration procedure established in the Bunker Hill Superfund Site Residential Yard Remedial Design Report.

Companies' R	eprese	ntati	ve	
 Estimated da	tes of	yard	remediation	

Owner

I have read this Warranty and understand it.

An Institutional Controls Program (ICP) has been developed pursuant to the Consent Decree governing the cleanup of this property. The purpose of the ICP is to ensure that excavations, building development construction, renovation, and grading within the Bunker Hill Superfund Site do not compromise barriers and do not expose contaminated materials. To that end, no person shall excavate a non-remediated site nor breach a protective barrier, for both exterior and interior projects, without first obtaining a permit.

Date

Permits may be obtained by contacting:

Panhandle Health District
Environmental Health Program
114 W. Riverside Avenue
Kellogg, Idaho 83837-2351
Phone (208) 783-0707

Purpose

To provide the Project Coordinator with a procedure for evaluating and certifying that soil barrier layers, placed during remediation of residential areas, are in conformance with the requirements of the Residential Soils Record of Decision (ROD) and the Performance Standards outlined in the SOW and the applicable RDRs.

Procedure

Compliance assessments shall be conducted on yards, commercial properties or distinct rights-of-way ("properties"), as applicable, within a specified remediation area. Sample collection and assessments shall be in accordance with the following procedure:

- Compliance assessments should be conducted immediately upon completion of placement of the barrier layer in the selected property. In preparation for the assessment, a review shall be made of available pertinent documentation for the selected property, including analytical data collected prior to remediation; remediation plan/work authorization; photographs; etc.
- 2. Soil samples shall be collected from two representative and discrete locations within the remediated property; one from the front yard and one from the back yard, each in the approximate center of the remediated area and at least ten feet from any tree, structure or other object that may restrict the thickness of the barrier layer. Samples shall be collected using a suitable sampling device, permitting collection of an undisturbed sample. Soil samples shall extend continuously from the upper surface of the barrier layer to a depth three inches greater than the required barrier thickness for the subject yard.
- 3. The effective thickness of the installed barrier layer shall be assessed by measuring the length of the collected sample from the upper surface of the barrier layer material to the distinguishable interface between the newly placed barrier material and the underlying native soils. Determination of the barrier layer/native soil interface shall rely upon visual observation.

- 4. Upon completion of sampling and assessment activities, samples shall be replaced in the core hole and the site restored to the condition found prior to sampling.
- Confirmation sampling activities shall be documented on the 5. attached form. If the barrier thickness is in compliance with the remediation plan for the yard, the certification of acceptance shall be completed. If a collected sample indicates that the remediation in the sampled area is not in compliance with the remediation plan, two additional samples shall be collected from the vicinity of the failed sample and assessed to confirm whether the deficiency is real or is the result of sampling error. Where deficiencies are identified, the nature of the deficiency shall be explained in the appropriate section of the assessment and certification form, and made known to the remediation contractor immediately, so appropriate corrective actions be taken may expeditiously. Corrective actions taken shall also be documented on the form. Upon completion of necessary corrective actions, the certification of acceptance shall be completed.

BUNKER HILL SUPERFUND SITE RESIDENTIAL AREAS REMEDIATION ASSESSEMENT AND CERTIFICATION

Street Address:				
Legal Description: Lot I				
Date Assessed:	By:			
Status of Remediation: In	Progress _	Complete		
Required Barrier Materials: Type	9		Thickness	
_		nd other significant	•	and show sample
AREA REMEDIATION DATA:	imensions tro	om existing perman	ent structures.)	
Req'd Remediation Area	s.f.	Sample No.		
Req'd Barrier Thickness	in.	Material Type		
Calc'd Material Volume	c.y.	Measured Thickne	ess in.	in.
Actual Material Volume	c.y.			
Calc'd Barrier Thickness	in.			
COMMENTS: DEFICIENCIES: (Nature and Ext	ent, Action T	aken)		
CERTIFICATION It is hereby certified that the present of the site.	operty descril	bed herein has beer	n remediated in co	mpliance with the
A)540415404 0510557 5014			Project Coordin	ator

APPENDIX F

APPENDIX F

Bunker Hill Superfund Site Residential Yard Remediation Homeowner Arbitration Agreement

APPENDIX F

BUNKER HILL SUPERFUND SITE RESIDENTIAL YARD REMEDIATION HOMEOWNER ARBITRATION AGREEMENT

1.0 PURPOSE

This agreement contains the procedures to be followed to
resolve disputes which arise over damage to residential property
which may be caused by or result from remediation of residential
yards pursuant to the Consent Decree. The parties to this agreement
are, the owner[s] of real
property located at, and
the Settling Defendants. The parties agree that the procedures are
confidential, and are entitled to the same privileges that apply
generally to settlement negotiations.

2.0 ARBITRATION PANEL

The parties agree that an Arbitration Panel is authorized to settle the dispute over damage to residential property and any other issues authorized by the parties. The parties further agree that the decision of the Arbitration Panel will be final and binding on all parties.

The Arbitration Panel will consist of three individuals, one of whom will be a representative for EPA or the State of Idaho; one of whom will be a representative for The Settling Defendants; and one of whom will be employed by a local government in the Silver Valley.

3.0 MEETING REGARDING DISPUTE

Within ten (10) working days of the effective date of this agreement, the parties and the Arbitration Panel will meet at the

residential property that is the site of the alleged damage to resolve the dispute. Each party will explain to the Arbitration Panel, using witnesses, videotapes, photographs, documents, and other information, the following items:

- the nature of the damage;
- the party's theory of how the damage was caused; and
- the measures, if any, that should be taken to repair the damage.

In addition to asking clarifying questions, the Arbitration Panel may act as a moderator. However, the panel will not preside like a judge or arbitrator, and the formal rules of evidence will not apply. The meeting will not be recorded, but any party or the panel may take notes of the proceedings.

Immediately after the parties have presented the information, the Arbitration Panel will meet, by themselves, and agree on a resolution of the dispute. At least two (2) members of the panel must agree on the proposed resolution for the resolution to be binding on the parties. The panel will inform the parties in writing of their decision no later than 5:00 of the same day, unless both parties agree in writing to an extension of time.

After the Arbitration Panel has rendered its decision, the panel will return all dispute-specific information provided by the parties, and destroy any notes concerning the dispute.

4.0 COSTS OF ARBITRATION

There will be no cost to the homeowner for any costs incurred by the Arbitration Panel.

Expenses of providing information to the Arbitration Panel will be borne by the party producing such information.

5.0 EFFECTIVE DATE

	This	agreement	will	be	effective	upon	the	signatures	of	the
part	ies.									
	we	···-								
Homeowner							Dat	е		
									•	
		COmpa	int Re	אמיני	sentative				1):	a + e

McCulley Frick & Gilman, inc.

Austin Office

8900 Business Park Drive Austin, TX 78759-7439 512/338-1667 Fax: 338-1331

Wallace Office

524 Bank Street Suite 207 Wallace, ID 83873 208/556-6811

Fax: 556-7271

San Francisco Office

5 Third Street Suite 400 San Francisco, CA 94103-3205 415/495-7110 Fax: 495-7107

Missoula Office

Hammond Arcade Building 101 South Higgins Avenue Suite 12 Missoula, MT 59802 406/728-4600 Fax: 728-4698

Boulder Office

737 29th Street Suite 202 Boulder, CO 80303-2317 303/447-1823 Fax: 447-1836

Seattle Office

3400 188th Street Suite 400 Lynnwood, WA 98037-4708 206/778-8252 Fax: 771-8842